Lower Silver Creek Draft Wetland Delineation

Park City, Utah

Prepared for:

US Environmental Protection Agency

U.S. EPA Region 8 (EPR-SR)
1595 Wynkoop Street
Denver, CO 80202-1129
(303) 312-6101

Prepared by:

Tetra Tech

136 East South Temple, Suite 910
Salt Lake City, Utah 84111
(801) 364-1064
Fax (801) 364-2021
Tetra Tech Project No. 1157520046

March 18, 2008

Executive Summary

This report summarizes the Lower Silver Creek wetland delineation performed by Tetra Tech for the US Environmental Protection Agency from August through September, 2007. Determination of the extent of wetland communities within the Lower Silver Creek drainage was necessary in order to assess US Army Corps of Engineers (USACE) permitting requirements with respect to clean-up actions aimed at removing mine tailings accumulations.

The Lower Silver Creek project area encompasses 1,875 acres. It is located southeast of Park City, Utah, between Interstate 80 and Highways 40 and 278. The area is divided into numerous privately owned parcels. The Rail Trail State Park traverses the valley from south to north. Now a highly used recreational trail, it was once the site of a Union Pacific rail bed. Historically, tailings mills were located in the Lower Silver Creek floodplain.

Prior to and during the delineation effort, baseline data sources were reviewed. Climate and precipitation records, soil survey data, previous delineations, and information on land ownership and associated water rights were compiled to assist with field data interpretations.

Delineation protocol followed the USACE Routine Wetland Determination. A total of 50 sample plots were placed throughout the project area to test for the occurrence of wetland hydrology, hydrophytic vegetation, and hydric soils. If all three of these wetland indicators were found, the area was classified as a wetland and the boundaries were marked with pin flags and recorded with a GPS device. Numerous informal test pits were also used to connect wetland community boundaries.

Waters of the US (WUS) were also delineated. In addition to the Lower Silver Creek channel, irrigation ditches were investigated for whether their source of hydrology would qualify them for a WUS classification. Culverts and points of diversions were marked throughout the extensive irrigation system to document connectivity.

In total, 493.6 acres of wetlands were delineated, amounting to 26 percent of the Lower Silver Creek project area. Delineations encompassed most of the valley bottom west of the Rail Trail, as well as portions of the eastern side of the project area. Wetland communities found in the valley bottom were dominated by Baltic rush (*Juncus balticus*). Species compositions changed moving eastward to include other dominant wetland indicator species such as blue-joint reed grass (*Calamagrostis canadensis*), redtop (*Agrostis stolonifera*), clustered field grass (*Carex praegracilis*), and Nebraska sedge (*Carex nebrascensis*). Waters of the U.S. totaled 15.8 miles. An additional 4.1 miles of Non-wetland waters of the U.S. were also identified.

This draft wetland delineation report will be submitted to the USACE for their review and final jurisdictional determination.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

Tetra Tech, Inc. has been tasked with delineating the boundaries of wetland communities within the Lower Silver Creek project area on behalf of the United States Environmental Protection Agency (EPA). This report documents findings of the wetland survey effort.

1.1 Project Description

The Lower Silver Creek drainage is currently under review by the EPA to determine possible clean-up actions aimed at addressing metal contamination resulting from historic mining practices. A secondary objective of this EPA review was to identify the jurisdictional wetlands and waters of the U.S. (WUS) within the Lower Silver Creek project area. As this area is known to have high wetland potential, comprehensive wetland delineation was required in order to assess wetland considerations associated with clean-up actions. Silver Creek is a tributary to the Weber River, which flows to the Great Salt Lake. This connectivity denotes Silver Creek and the associated wetlands as jurisdictional.

Subsequent to US Army Corps of Engineers (USACE) jurisdictional verification, this report will be used in assessing the extent of potential impacts to wetlands resulting from clean-up actions, and to determine USACE permitting requirements associated with specific clean-up procedures. Land ownership in lower Silver Creek is divided amongst several private entities, thus, the wetland delineation results are presented for the Lower Silver Creek drainage as a whole and by ownership parcel. Access agreements were compiled prior to the start of field work.

At one time re-named Poison Creek by Park City residents, Silver Creek has long been known for its association with historic mining operations. The Big Four Mill, once located west of the existing Promontory Trailhead, began processing tailings of zinc, lead, and silver in 1916. The Union Pacific Railway stop of Atkinson grew into a town, housing workers from the tailings mills and railways located in the Lower Silver Creek valley. It was reported that 1,000,000 tons of tailings had accumulated along Lower Silver Creek, stretching for 3.5 miles and averaging 30 inches deep (Elliot 1995). It is primarily the consequences of these historic tailings operations and mining activities upstream that warrant this environmental clean-up analysis.

1.2 Project Area

Silver Creek begins in the Wasatch Mountains above the town of Park City, Utah, and lies within the Weber River Basin. The Lower Silver Creek project area is situated east of Highway 40, bounded by Highway 248 on its southern end and Interstate 80 to the north (**Figure 1**). It is located in Township 1 South Range 4 East, in Sections 10, 11, 15, 14, 22, 23, 27, 26, and 35, with approximately 500 feet occurring in Section 2 of Township 2 South Range 4 East. The study area ranges in width from 2,100 feet wide at the southern boundary to 3,800 feet wide near Pivotal Promontory Road, encompassing approximately three square miles or 1,875 acres.

Topographically, the floodplain containing the creek is relatively flat. The eastern side gradually rises in the form of grassy meadow benches and sagebrush toe-slopes: Sagebrush dominated toe-slopes also rise along the western edge. The Rail Trail State Park runs north-south, paralleling the valley bottom between the floodplain and eastern rise. It was once the Union Pacific Railroad rail bed.

1.3 Definitions and Applicable Statutes and Regulations

The definitions of wetlands and waters of the U.S. considered in this analysis are provided below. State of Utah regulations governing stream alterations are also discussed. Note that activities on a CERCLA (Comprehensive Environmental Response, Compensation and Liability Act of 1980) site do not require permitting under Section 404 or Section 10 if activities are under the direction of the EPA.

Wetlands are defined as:

> *Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas* (Federal Register 1982).

As defined in 33 CFR Part 328, waters of the U.S. are navigable and/or interstate waterways or tributaries to them, including adjacent wetlands. Section 404 permits are required when discharges of dredged or fill material would be placed in these waters. The Clean Water Act was enacted to protect the Nation's waters; within the Act, Section 404 addresses unregulated discharges of dredged or fill material. Under this Section, the USACE reviews proposed projects with respect to their potential impacts to wetlands and may issue permits allowing the regulated discharge of dredged or fill material into wetlands and waters of the U.S. with stipulations regarding required mitigation and reclamation.

Section 10 of the Rivers and Harbors act of 1899 also requires permitting for any work in or over navigable waters of the US which may affect the course, location, condition, or capacity of such waters. Activities under Section 10 include excavation.

Regulatory Branch Memorandum 2004-03 (February 13, 2004) provides guidance regarding "leaky ditch" wetlands, in that wetlands created exclusively by leakage from irrigation ditches excavated in areas otherwise classified as upland are not jurisdictional. As well, these irrigation ditches would also not qualify as waters of the U.S.

Regulatory Branch Memorandum 2007-01, dated March 13, 2007, provides jurisdictional guidance regarding irrigated wetlands. Following field review of the three wetland criteria, if an area under the influence of irrigation appears to be a wetland, the first method for verification would be discontinuing the application of irrigation water. If the area is solely sustained as a wetland by irrigation, the area would not be considered jurisdictional. Cessation may be required to occur for at least two growing seasons. If this method is not practical, a review of NRCS land classification and soil surveys could reveal whether the area is a prior converted wetland or a farmed wetland pasture, or whether hydric soils have been mapped for the area in question. Also, a review of aerial photos, previous delineations, federal and state agency records, irrigation districts, or other pertinent data would be used for decision purposes. If the three wetland indicators of soils, vegetation, and hydrology have been documented, and a source of natural hydrology is identifiable, then the irrigated area would be considered a wetland. However, if it is difficult to determine the relative contribution of irrigation versus natural hydrology, then "normal circumstances" are considered. This final determination depends on whether site conditions, such as topography, appear to support circumstances where a wetland would likely occur; a jurisdictional decision would be based on this evidence.

The Utah State Engineer's Office also regulates activities with the potential to affect natural streams under the Stream Alteration Program. Individual Stream Alteration Permits are issued by the State engineer following review of a project's potential to impact water rights, recreation use, aquatic wildlife, and the stream's ability to conduct high flows. A Stream Alteration Permit has an open comment period of 20 days.

2.0 PRE-FIELD DATA REVIEW

Prior to and during field work, existing sources of information relevant to the project area were reviewed. Sources included aerial photographs, topographic maps, Summit County Soil Survey data, National Wetland Inventory (NWI) maps, previous wetland delineations, precipitation and climatic records (WETS tables), irrigation use, and historic and current water rights.

2.1 Climate and Precipitation

Silver Creek is a tributary of the Weber River, and is located within the Upper Weber River Subbasin of the larger Weber-Ogden River Basin. In the semi-arid climate of this region, evapotranspiration exceeds precipitation throughout the year except in winter months (Stonely 2004). Precipitation in the basin fluctuates widely both seasonally and from year-to-year, and as a consequence total amounts rarely equal the average (Stonely 2004).

In order to characterize the existing hydrologic conditions at the study site, Tetra Tech acquired historic climate records (years 1971 to 2000) in the form of a WETS table published by the Natural Resources Conservation Service (NRCS). WETS refers to the program used to compile data from approximately 8,000 climate stations in the National Weather Service network. The data is typically used in wetland studies to define the normal range of monthly precipitation and the normal range for the growing season for a given area over a given time. The table was acquired from the Wanship Dam climate station, located approximately 7.5 kilometers (3.7 miles) northeast of the study site (**Appendix A**). In addition, recent climate records for Wanship Dam (years 2002 to 2007) were acquired from the Utah Climate Center (http://climate.usurf.usu.edu/) (**Appendix B**).

2.1.1 Historic Annual Precipitation

Average temperatures (1971 to 2000) at the Wanship Dam station range from 23.5° Fahrenheit (F) in January to 66.5° F in July and the typical growing season spans from May through September. Average annual precipitation (1971 to 2000) at this station is 16.53 inches, with sixty percent of that typically falling in winter months (October through April). Annual precipitation for the three years preceding this delineation totaled 18.54 inches (2004), 17.43 inches (2005), and 18.49 inches (2006). These values were within the normal annual range as reported in the WETS table (14.47 to 18.63 inches). From January through September of 2007 the precipitation at this station totaled 9.81 inches, which was 81 percent of the normal 12.17 inches for this nine month period.

2.1.2 Historic Monthly Precipitation

At the Wanship Dam station, normal monthly precipitation (1971 to 2000) for the three months prior to and during the months of the field investigation averaged:

- June, 1.01 inches
- July, 1.07 inches
- August, 1.03 inches
- September, 1.48 inches.

Precipitation for these months in 2007 totaled:

- June, 0.75 inches
- July, 1.20 inches

- August, 1.22 inches
- September, 2.58 inches

The totals for three of these months, as reported in the WETS table, were within the normal ranges of:

- 0.44-1.44 inches (June),
- 0.57-1.43 inches (July),
- 0.42-1.40 inches (August).

The exception was the month of September 2007, during which total precipitation was greater than the normal range of 0.80 to 1.91 inches.

Silver Creek stream flow levels were acquired for the USGS gaging station (number 10129900) (labeled as water right diversion station 8803 on **Figure 4**, in the northeast quarter section of 15). The station is located at the north end of the project area and thus measures stream flow exiting the site. Stream flow values averaged over a five year period (October 2001 through September 2006) indicate that average monthly water levels (in cubic feet per second) were greatest in:

- March (12 ft^3/s),
- April (15 ft^3/s), and
- May (10 ft^3/s)

And lowest in:

- July (2.2 ft^3/s),
- August (2.1 ft^3/s), and
- September (2.1 ft^3/s).

Field investigations were conducted in months when stream flow is typically lowest at this gaging station (August-September). Provisional data from the station indicated that stream flow preceding and during the months of the 2007 field investigations were lower than the five year average (July 1.2 ft^3/s, August 2.0 ft^3/s, September 1.4 ft^3/s). Brooks et al. (1998) suggested that the peak flow in March and April is a result of low-elevation snowmelt, and the smaller peak in May is a result of high elevation snowmelt. Note that the water flow at this gaging station is affected by discharges from a water treatment facility upstream, although peak discharges apparently are concurrent with the peak of low elevation snowmelt (Brooks et al. 1998).

2.1.3 Drought Conditions

At broader spatial and temporal scales, this region of Utah has recently experienced drought conditions. A long-term drought occurred across the state of Utah from 1999 to 2004 (UDWR 2007a). During this drought period, precipitation in the Weber-Ogden River Basin ranged from approximately 73 percent (2001) to 100 percent (1999) of average (UDWRb 2007).

In 2005, the basin was wetter than average by 115 percent and was 95 percent of normal in 2006. For the 2007 year, the year-to-date precipitation (as of September 13, 2007) was 77 percent of average (NRCS 2007).

The Palmer Drought Index estimated by the National Oceanic and Atmospheric Administration (NOAA), on September 14, 2007 (http://www.drought.unl.edu/dm/monitor.html) classified the

northern mountains division of Utah with values of -3.0 to -3.9, which indicated severe drought conditions.

2.2 Soil Survey

Soil mapping data was obtained from the USDA NRCS website (http://soildatamart.nrcs.usda.gov/). Map unit descriptions were also obtained from Soil Survey and Interpretations Parleys Park Portion of Soil Survey of Summit Valley Summit County, Utah (USDA SCS 1977). A description of the mapping units known to occur within the project area is included below. Mapping unit names and acreages represented in the project area are shown in **Table 1.**

All soils within Lower Silver Creek are generally classified as occurring in areas with an average annual precipitation between 16 and 22 inches, a mean annual air temperature of 40 to 45 °F, and a frost-free season averaging 60 to 90 days. Map unit types found in the project area are displayed in **Figure 2** and described below.

The **Fewkes gravelly loam**, occurs on 2 to 8, and 8 to 15 percent slopes (map unit code 128), and is classified as fine-loamy, mixed, superactive, frigid Calcic Argixerolls. Fewkes gravelly loam is associated with NRCS Rangeland Site – Mountain Loam, with a dominant vegetation type of Mountain Big Sagebrush. This is a well-drained soil with a typical profile of gravelly loam and clay loam. It is formed from sandstone, quartzite, and shale alluvium material.

Wanship-Kovich loams, occur on 0 to 3 percent slopes (map unit code 179), and is defined as very deep, containing somewhat poor to poorly drained soils, known to occur within the floodplain of Lower Silver Creek. Soils contain a mix of sand-textured mine tailings that have been distributed over a dark silty clay loam (USDA SCS 1977). The texture in the upper two feet of a typical Wanship soil profile is loam. Taxonomic classification is fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Aquic Cumulic Haploxerolls. The Kovich soil contains more clay, and is taxonomically classified as fine-loamy, mixed superactive, frigid lithic Endoaquolls.

The **Ayoub cobbly loam** occurs on 2 to 15 percent slopes (map unit code 106) and is a fine-loam, mixed, superactive, frigid typic Argixerolls. Ayoub cobbly loam is associated with the NRCS Rangeland Site – Mountain Gravelly Loam, which occurs in Mountain Big Sagebrush vegetation communities. This soil is associated with slope alluvium derived from andesite over weathered residuum on mountain slopes. It is considered well-drained, with a typical profile consisting of cobbly loam over gravelly clay loam.

The **Ayoub-Dunford-Melling** complex occurs on 15 to 30 (map unit code 107) and 30 to 60 (map unit code 108) percent slopes. This map unit is composed of 45 percent Ayoub (see taxonomy above), 20 percent Dunford (Fine-loamy, mixed, superactive, frigid, Pachic Argixerolls), and 20 percent Melling (Loamy-skeletal, mixed, superactive, frigid Lithic Argixerolls). Soils occur on mountain slopes and are derived from colluvium and alluvium, andesitic material. The typical Ayoub profile is the same as described above, the Dunford and Melling profiles are a cobbly loam over gravelly clay loam, differing in horizon thickness. However, the Dunford component is assocated with NRCS Rangeland Site – Mountain Gravelly Loam (Oak). The Melling soil is associated with the NRCS Rangeland Site – Mountain Shallow Loam (Mountain Big Sagebrush).

The **Horrocks-Cutoff complex** occurs on 15 to 30 percent slopes (map unit 144) and consists of 60 percent Horrocks and similar soils, and 30 percent Cutoff and similar soils. This map unit is associated with the NRCS Rangeland Sites – Mountain Stony Loam and Upland Stony Loam, which are dominated by the vegetation community type Mountain Big Sagebrush. The Horrocks-Cutoff complex occurs on alluvial fans of all aspects and is considered well drained. Soils within the mapping unit vary by the amount and size of rock fragments. Textures in the Horrocks component are classified as very cobbly loam, whereas, the Cutoff soil is dominated by very gravelly loam.

Minor soil components of the project area include six acres of Melling-Ayoub-Rock outcrop complex on 10 to 30 percent slopes (map unit 158) in the northeast corner by the golf course, and Ant Flat loam, 2 to 8 percent slopes (map unit 102) comprises less than one acre in the northwest corner by the highway.

2.3 Local and National Wetland Inventories

Approximately 168.7 acres or nine percent of the Lower Silver Creek project area was previously delineated by the National Wetland Inventory (NWI) conducted by the US Fish and Wildlife Service (USFWS). Note that this inventory system does not represent a complete delineation of the entire project area. Acreages by wetland type are exhibited in **Figure 3** NWI Wetland Map and **Table 2**. This data was created by the Automated Graphic Reference Center (AGRC), Salt Lake City, UT January 2001. Ten different wetland codes were delineated in the NWI classification. These codes are presented in order of diminishing acreage.

PEMC, or palustrine, emergent, and seasonally flooded, was the most abundant type mapped in the project area in the NWI, totaling 138.7 acres. Code components of system, class, regime, and special categories from Table 2 are defined from the NWI Code Descriptions website as follows:

- *Palustrine (P)* "includes all non-tidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean derived salts is below 0.5 parts per trillion (ppt). Wetlands lacking such vegetation are also included if they exhibit all of the following characteristics: are less than 8 hectares (20 acres); do not have an active wave-formed or bedrock shoreline feature; low water at a depth less than 2 meters (6.6 feet) in the deepest part of the basin; or have a salinity due to ocean-derived salts of less than 0.5 ppt.
- *Emergent (EM)* is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. This vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.
- *Seasonally Flooded (C)* is defined as surface water presence for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface."

The *Upland (U)* type was found in 15 acres mapped in the NWI. Uplands are defined by NWI as "All areas not defined as wetland or deepwater habitats."

The *PEMCH* type, or palustrine, emergent, seasonally flooded, and diked/impounded, is only represented in six acres of the area delineated in the NWI. (P)(EM)(C) is as described above.

Diked / Impounded (h) is defined by NWI as, "created or modified by a man-made barrier or dam which obstructs the inflow or outflow of water."

The *PUSA* type, or palustrine, unconsolidated shore, temporarily flooded, was delineated in NWI in only four acres near the water treatment facility. (P) is defined above. *Unconsolidated Shore (US)* is defined to "include all wetland habitats having three characteristics: (1) unconsolidated substrates with less than 75 percent area cover of stones, boulders, or bedrock; (2) less than 30 percent aerial cover of vegetation other than pioneering plants; and (3) any of the following water regimes: irregularly exposed, regularly flooded, irregularly flooded, seasonally flooded, temporarily flooded, intermittently flooded, saturated, seasonal-tidal, temporary-tidal, or artificially flooded. Intermittent or intertidal channels of the Riverine System or intertidal channels of the Estuarine System are classified as Streambed. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class." *Temporarily Flooded (A)* is defined as "surface water presence for brief periods during growing season, but the water table usually lies well below the soil surface. Plants that grow both in uplands and wetlands may be characteristic of this water regime." *Semi permanently Flooded (F)* is defined as surface water that persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land's surface.

The PABFH PAB/EMF, PEMA, PABFX, PUSAH, PEMF types equal approximately one acre or less under the NWI delineation and are too minimal to be entirely defined.

When the 15.2 acres of upland is subtracted from the total NWI amount, 153.5 wetland acres were delineated in the NWI. Much of the Silver Creek floodplain was not included in the NWI inventory. Based on the NWI documented wetlands within the project area some generalizations are apparent. Close to Lower Silver Creek below the diversion ditch, areas are delineated by the NWI as PEMC. Along the eastern side, some areas adjacent to the ditch are defined as U, and a few locations are identified as wetlands formed by impoundments (PEMCH) (**Figure 3**).

2.4 Land Ownership

The 82 ownership parcels and the associated land owners are listed in **Table 3**. This report presents results for those parcels for which permission was granted to perform delineation.

2.5 Water Rights

Water rights were researched using historic hydrographic maps, points of use (POU), points of diversion stations (WRDVRT), water right diversions (WRPOD), and water right database sheets in order to assess the effect irrigation practices have had on wetlands in the project area. Also relevant are whether diversion patterns have contributed to soil contamination and which water rights may be affected during cleanup efforts. Details about locations, quantities, sources, ownership and uses are disclosed. Water rights information was obtained from the internet (http://www.waterrights.utah.gov) by querying property owners. Water right numbers were obtained from the water rights GIS shapefiles. **Appendix C through F** and **Figures 4 and 5** include water rights data.

2.5.1 Hydrographic Maps

Historic adjudication hydrographic maps were obtained from the State of Utah Water Rights website (http://www.waterrights.utah.gov) for approximately half of the sections in the project area. They include Sections 15, 22, 23, 26, and 35 (**Appendix C**) which cover the floodplain of the project area. Arrows primarily indicate northerly hydrologic flow. A date of 11-21-35 is found on the map displaying Section 15. Important details to note include:

- Silver Creek enters the project area on the eastern side of the railroad bed, crossing it northeast of the Union Lime and Stone Company and continues north through the middle of the project area to the western side of the floodplain in Section 22. Silver Creek then crosses back to the middle of the floodplain where it exits the project area in Section 15.
- The G. M. Pace Ditch runs along the eastern side of the project area. Multiple channels, labeled as seepage ditches distribute water to the north and northwest.
- The Pace and Homer Ditch enters the project area in the southwest part of the project area in section 35, just north of the Union Lime and Stone Company, where it is channeled across the floodplain into the G.M. Pace Ditch.
- Pace Spring Ditch enters just parallel to and north of the Pace and Homer Ditch and moves water north into Spring Ditch, which flows west of Silver Creek.
- In the middle of the northeast section of 15, a darkened area was distinguished as springs.

2.5.2 Water Rights Points of Use

Water right points of use (WRPOU) are the areas of irrigated acreage drawn as polygons from digitized hydrologic survey maps. Water right points of use were found in 583.5 acres or 31 percent of the Lower Silver Creek project area (**Table 4**). Polygons 1 through 6 are represented by six water right numbers 35-8820, 35-8968, 35-5706(a16060), 35-5828(a17205), 35-5842(a17320), and 35-10075(a19202), respectively. Polygon 7 at the southwest end is represented by water right 35-8818. Points of use are shown in **Figure 4** as color-coded and numbered polygons. The water right information derived from the State of Utah database associated with these areas is located in **Appendix E1.**

Water right number 35-8968 obtains 2.1 ft^3/s or 444.2 acre-feet from seeps. Surface points of use and points of diversion associated with this right occur in every section of the project area except 27. Originally 2.22 ft^3/s or 600 acre-feet were used to irrigate 200 acres of land. Water right number 35-10075 was segregated in 1995 for 0.12 ft^3/s (27.6 acre-feet) on 9.2 acres. Further segregation occurred in 1997 when water right 35-10525 acquired 128.25 acre-feet for 42.75 acres.

Water right 35-8820 obtains 2.1 ft^3/s (205.83 acre-feet) from Silver Creek and the Dorrity and Pace Springs, maintaining a priority date of 1861. A diversion point occurs immediately outside the project area in Section 35. Municipal Building Authority of Park City withdrew water right number 35-5706 (change number a16060) of 397 acre-feet from Silver Creek and Pace Spring and 363 acre-feet from a well. This water right was originally owned by J.E. Pace as a member of the Silver Creek Irrigation Company with a priority date of 1861. Park City seeks to change the water right associated with the well from irrigation to municipal uses. Water rights 35-5828 (a17205), 35-5842 (a17320), and 35-10075 (a192 02) are listed as unapproved.

Water right points of use are located in approximately one-third of the project area. Much of these water rights are dated back to 1861. Irrigation ditches using water from Silver Creek and other tributary springs have historically altered natural hydrology and wetland communities in the project area.

2.5.3 Water Right Diversion Stations

Water right diversion stations (WRDVRT) are physical structures used for the control of water for irrigation purposes. The diversion information provided in this report was obtained during field visits by the Utah Division of Water Resources staff. There are 16 diversion stations in the project area (**Figure 4**). Photos are included as **Appendix D** and copies from the State of Utah Water Rights webpage are in **Appendix E1 & E2**. Based on field observations and water rights database photos, the more significant are Station ID #8886-1115-Mountain Regional Well 10, #8781-0248-Homer Spring, #8802-0269-Pond, #8803-0270-USGS Gage, #8806-0273-Treatment Plant Discharge, and #8813-0280-Pond (presently dry).

2.5.4 Water Right Points of Diversion

The water rights points of diversions are generated from basic information in the tabular database. Locations in the coverage have been computed from information submitted with water right applications. There are 38 water rights points of diversion within the project area (**Table 6** and **Figure 4**).

Twelve water rights are listed as approved (a) or perfected (p: proof filed, right certificated), the remaining 27 have a terminated status. Printouts of the 12 active water rights are included in **Appendix E2**, are shown at the top of **Table 6**, and have been highlighted in red in **Figure 4**. There are three categories of water rights listed in the project area; spring, surface, and underground. Spring is defined as a "concentrated discharge of ground water coming out at the surface as flowing water." Surface points of diversion are classified as "streams, rivers, creeks, and any water above ground." Underground is specified as "wells, tunnels, sumps, and underground drains."

Water right number 35-10074, Section 15, lists Silver Creek and Pace Springs as sources with priority dating back to 1861. Its 0.12 ft^3/s (31.6 acre-feet) is used for irrigation. It is affected by five different surface points of diversions.

Number 35-8829, located in Section 35, is owned by the State of Utah Division of Parks and Recreation and delivers 0.03 ft^3/s from the Homer Pace Spring. The water is listed as used for domestic, irrigation, and other purposes. Water right 35-9586, owned by Gilbert Western Corporation is located in Section 15 below the Silver Creek Water Treatment Plant. It delivered 70 acre-feet from Silver Creek to a place of use during Highway 40 construction from 1992-1993.

The remaining eight water rights are derived from underground sources and are described below. Two in particular supply significant amounts of water to the project area. Water right number 35-10075, originally water right number 35-8820, is found in Section 22 and is derived from wells for municipal purposes. Number 35-11015, located in Section 22, is owned by Mountain Region Water Special Service District. It provides 372 acre-feet from Wanship Reservoir via the Weber River.

2.5.5 Adjacent Water Rights

Adjacent water rights are those occurring outside of the project area, but which may still influence water available in the project area. The adjacent water rights are detailed below. Water rights point of use polygons 1, 6, and 7 extend outside the project area. There are 11 water rights diversion stations that control flow of water into the project area.

Current adjacent water right points of diversion that were within 1,000 feet of the project area boundary and that have higher flow rates, ranging from 7,000 to 200 ft^3/s, are listed in descending order of flow: 35-11587, 35-11804, 35-10447, 35-5706, 35-10525, 35-11015, 35-11980, 35-10075 and 35-8820 (**Figure 5**). Adjacent water rights are also listed in **Appendix E3**. Some of these water right numbers may also pertain to rights inside the project area and are therefore also found in **Appendix E1** or **E2**. Other water rights beyond the 1,000-foot buffer that also influence flows in the project area may exist, but are not included in this analysis.

The following water rights, although outside of the project area boundary, were found by searching the State of Utah Water Rights database by land ownership names located within the project area. They include numbers 35-11805 and 35-9397.

Water rights number 35-11805 with priority from 1861 equals 0.25 ft^3/s (60 acre-feet). Water from Silver Creek is diverted via the G.M. Pace Ditch from 500 feet north and 625 feet west of the southeast corner of Section 35. Water from the Dorrity and Pace Spring is diverted via the Pace Spring Ditch at 1,850 feet north and 125 feet west of the southern quarter corner of Section 35. Associated places of use are found in Sections 10, 14, 15, 22, 23, 26, and 35 of T1S R4E and Section 2 of T2S R4E. This right was segregated from water right number 35-11804 in 2005.

Water right number 35-11804 contributes 1.86 ft^3/s (450.18 acre-feet). The diversion points are identical to water right number 35-11805. Irrigation for 150 acres and drinking water for 60 stock units is provided in Sections 10, 14, 15, 22, 23, 26, 35 and Section 2. This water right was segregated from 35-8820.

Water right 35-9397, which uses 30.0 acre-feet from wells, requested a change of use for one well from cattle watering to horse and domestic use associated with the equestrian facility. Several underground points of diversion are associated with this right.

Water right number 35-11980 (255.09 acre-feet) is diverted at the same locations as 35-11805 and 35-11804. Silver Creek and Dorrity and Pace Springs are listed as its source.

Historic and current water right ownership and use is relevant with respect to the influence of hydrology on wetland conditions. Irrigation has been a major component in vegetation and soil development with respect to wetlands. Water distribution has been altered from its original course, thereby changing areas that may have been wetlands before settlement and creating irrigation-induced wetlands in others. Alterations to the hydrology of Lower Silver Creek are evidenced by the multitude of diversions throughout the project area. The associated maps and tables are meant to assist in making jurisdictional determinations of the wetland delineation presented in this report and aid in developing cleanup options in Lower Silver Creek.

3.0 SITE DESCRIPTION

The following is a generalized description of the project area including hydrology, vegetation, soils, and land use history.

3.1 Hydrology

Primary hydrologic sources within the project area include Silver Creek in-stream flow, overland flow, and groundwater discharge through springs and seeps (**Figure 6**). As mentioned, extensive irrigation systems of ditches and diversions have altered original hydrologic flows. Silver Creek is diverted into a large irrigation ditch called the G. M. Pace ditch at the southern end of the project area that carries water through the project area along the eastern side.

Calculations from the State of Utah AGRC Geographic Information Database (SGID) shape file layer indicated there are 61,773 feet or 11.7 miles of streams in the project area. The original channel of Silver Creek within the project area measures 25,895 feet or 4.9 miles, and flows from south to north.

South of Promontory Road, hydrologic inflows are derived from several wells on the west side of the project area, and Homer Spring located on the east side of the Rail Trail. A spring-fed drainage northwest of the Geneva Rock Products facility enters the project area via a culvert in the southwest corner. This is the historic location of the Union Lime and Stone Company in Section 35. Of note, water exiting this culvert contained impurities of thick cloudy, white sediment and frothy foam.

Mr. Stan Pace approached field crew members on August 24, 2007. He told us he was born in the Lower Silver Creek drainage and that his family had owned land from the time it was settled. He told us the floodplain historically contained no defined channels and that much of the area consisted of unvegetated sand flats. He witnessed the development of channel formation in the wetland over time. He spoke of the past when the water table was much higher and they were able to ice skate throughout the floodplain. Many of the channels are now demonstrably entrenched and occur throughout much of the length and width of the floodplain. The entrenched channels appear to move water out of the area, contributing to the lowering of the groundwater table throughout much of the main floodplain and an associated reduction in the extent of wetlands. Mr. Pace also informed field crew members that a pond was once filled by way of truck using Silver Creek water to irrigate their pastures. This pond, located near the eastern edge of the project area, is currently dry and appears to have not been used for several seasons.

3.2 Vegetation

Baltic rush (*Juncus balticus*), commonly called wiregrass, dominates the valley bottom of Lower Silver Creek. This rhizomatous rush attains up to 100 percent cover. As the topography gradually begins to rise along the sides of the valley bottom, the dominance by rush changes to include redtop (*Agrostis stolonifera*), sedges (*Carex* spp.) and reed-grass (*Calamagrostis* spp.). Vegetation then begins to include species such as foxtail (*Hordeum* spp.), and eventually gradates to upland grass and shrub species such as wheatgrass (*Agropyron trachycaulum*) and sagebrush (*Artemisia tridentata*). Livestock grazing and the preference for more palatable vegetation have selectively led to the dominance of Baltic rush in some of the wetland areas. A list of vegetation species recorded in the project area is included in **Appendix I**.

3.3 Soils

Soil units found within the project area are displayed in **Figure 2**. Mapping unit names and acreages represented in the project area are shown in **Table 1.** Soil mapping data was obtained from the USDA NRCS website (http://soildatamart.nrcs.usda.gov/). Map unit descriptions were also obtained from Soil Survey and Interpretations Parleys Park Portion of Soil Survey of Summit Valley Summit County, Utah (USDA SCS 1977).

All soils within Lower Silver Creek are generally classified as occurring in areas with an average annual precipitation between 16 and 22 inches, a mean annual air temperature of 40 to 45 °F, and a frost-free season averaging 60 to 90 days. As described in section 2.2, the map unit types found in the project area are displayed in **Figure 2** and listed below.

- The Fewkes gravelly loam soil type is the most abundant in the project area, covering 878 acres, and is located in five upland polygons along the eastern and western sides of the floodplain in the project area. Agricultural uses dominate this soil type.
- The Kovich soil is included on the Hydric Soils of Utah list. There are 523 acres of Wanship-Kovich loam mapped in the project area.
- Ayoub cobbly loam occurs in the northern portion and in other upland areas on the western side of the project area and totals 281 acres.
- The Ayoub-Dunford-Melling complex is found in the southeast corner of the project area and equals 119 acres.
- The Horrock-Cutoff Complex is located in the southwest corner of the project area along the floodplain and totals 65 acres.
- Minor soil components of the project area include six acres of Melling-Ayoub-Rock outcrop complex on 10 to 30 percent slopes (map unit 158) in the northeast corner, and Ant Flat loam, 2 to 8 percent slopes (map unit 102), comprises less than one acre in the northwest corner by the highway.

3.4 Land Use (Irrigation History and Land Use)

Irrigation practices have been used extensively throughout the Lower Silver Creek drainage to support livestock grazing, resulting in changes to the landscape, particularly on the eastern side of the creek in Sections 14, 15, 23, and 26. Through the network of ditches, these practices have resulted in some wetlands that appear to be irrigation-induced; categorized as an atypical situation according to the 1987 Manual (USACE 1987). Final jurisdictional determination will be made following USACE review of this report.

4.0 METHODS

This section outlines methodology used to perform the Lower Silver Creek wetland delineation. Field methods and the function and values analyses are explained below.

4.1 Field Methodology

The Routine Wetland Delineation Protocol, in accordance with the 1987 US Army Corps of Engineers Wetland Delineation Manual, was used for data collection purposes. Two 2-person crews began the field effort on August 20, 2007, working through to August 28, 2007. Additional field days carried the preliminary delineation field work through September 14, 2007.

The presence of standard indicators of wetland hydrology, hydric soils, and hydrophytic vegetation were used to determine the extent of wetland habitat. Evidence of all three indicators is required by USACE standards in order to classify an area as a wetland.

Global positioning system (GPS) Trimble XT units with sub-meter accuracy were used to collect feature location data such as wetland and WUS boundaries, plot locations, and important hydrologic features. The GPS data was differentially corrected and then verified for accuracy. Delineation boundaries were also marked in the field with pink "Wetland Delineation" pin flags.

A total of 40 routine sample plots were placed in the project area. The sample plots were used to define characteristics of the site's soil, vegetation, and hydrology. Plots were located throughout the project area as changes in vegetation or topography were encountered in order to capture samples in all representative communities. Numerous informal test pits were also dug during the survey effort to assist in boundary determinations.

4.1.1 Hydrology

Hydrologic indicators are listed as either "Primary" or "Secondary" on the routine form. Either one primary or more than one secondary indicator is required in order to satisfy the hydrology criterion for a wetland definition.

- Primary indicators may include inundated or saturated soil, drainage patterns, or sediment deposits.
- Secondary indicators include examples such as oxidized root channels or local soil survey data that documents the presence of hydric soils.

Sources of hydrology in the Lower Silver Creek project area include overland flow, seeps, and springs. The east- side ditch carries water from the diversion structure on the southern end of the project area to several parcels located throughout the center. Water also enters the project area via spring-fed ditches and seeps.

Due to the late-season timing of the wetland delineation and the relatively low precipitation of the current year, evaluation of hydrology for the wetland determination using primary indicators was not always possible. Determination of wetland hydrology was assumed at some locations based on the dominance by hydrophytic vegetation and hydric soil characteristics.

Information on water rights and irrigation practices was also used to support determinations of wetland hydrology. During field visits hydrologic connectivity was recorded by following ditches, marking culverts with GPS points, and noting whether ditches appeared wet or dry based on the presence of wetland vegetation. This information was also used to delineate and map waters of

the U.S. Aerial photography maps were also used to digitize drainage patterns, inflow points, and connectivity of ditches (**Figures 4 & 5, Tables 4-6, and Appendix D-F**).

4.1.2 Vegetation

The Region 8 list of hydrophytic vegetation (from USFWS National List of Plant Species that Occur in Wetlands) was used to categorize the wetland indicator status of each species observed in the project area. Hydrophytes are those plants specifically adapted to live in saturated soils. The indicator status categorizes wetland and upland species into two groups: hydrophytes and non-hydrophytes.

Hydrophytes are further defined based on the frequency of occurrence in identified wetlands. These groups include obligate wetland species, facultative wetland species, facultative species, facultative upland species, and obligate upland species. The obligate plants define each end of the habitat spectrum relative to available water in the soil (wetland or upland), while the facultative plants exist to varying degrees in each habitat.

- Obligate wetland plants (OBL) are those that occur almost always (estimated probability > 99 percent) in wetlands under natural conditions.
- Facultative wetland plants (FACW) have an estimated probability of occurring in wetlands >67 percent to 99 percent, but also occur 1 to 33 percent in non-wetlands.
- Facultative plants (FAC) occur in both wetlands and non-wetlands with an estimated probability of 33 to 67 percent.
- Facultative upland plants (FACU) occur more often in non-wetlands with an estimated probability of >67 to 99 percent and occur in wetlands only 1 to <33 percent of the time.
- Obligate upland plants (UPL) occur in drier soils and rarely in wetlands at a rate of <1 percent.

The facultative categories also include a positive (+) or negative (-) sign to further distinguish species' wetland preference. The (+) sign indicates wetter conditions, while the (-) sign indicates a frequency toward the drier end of the category.

- Hydrophytic vegetation includes all plant species categorized as obligate wetland (OBL), facultative wetland (FACW+, FACW, FACW-) and facultative (FAC+ and FAC), and
- Non-hydrophytic vegetation includes plant species classified as facultative (FAC-), facultative upland (FACU+, FACU, FACU-) and obligate upland (UPL).

Categorizing an area as a wetland is then based on the percent coverage of each plant type. If vegetative cover consists of at least 50 percent obligate, facultative wetland, and facultative species then the site satisfies the wetland criterion for vegetation.

4.1.3 Soils

Soils were characterized in the field by digging a soil pit 20 inches deep and identifying the horizons. Horizon thickness, soil color, texture, and structure, and the abundance and size of mottles, if present, were recorded. The map unit name, soil taxonomy, and drainage class were obtained from the soil website www.nrcs.gov.

4.2 UDOT Wetland Functional Assessment Method

The Utah Department of Transportation (UDOT) Wetland Functional Assessment Method, UDOT Report No.UT-06.12 (Johnson 2006), defines a protocol to evaluate and quantify the inherent properties of a wetland and results in a ranking of wetland functions and values. It intends to identify areas of higher functional value in order to facilitate their avoidance with respect to disturbance activities.

The UDOT Wetland Functional Assessment Method was determined to be an appropriate methodology for the Lower Silver Creek wetland function and value evaluation. Although originally designed for application to highway and other linear projects, the method incorporates characteristics specific to Utah, such as wetland types, wildlife species, and other State-specific issues such as water quality.

Wetland functions are inherent wetland properties that may be categorized as either biological or hydrological. Examples of wetland functions include providing habitat for special-status species and flood attenuation. Wetland values measure society's view of a functions' worth, and include examples such as recreational opportunities provided by a wetland or its aesthetics.

The UDOT Wetland Functional Assessment method first classifies a given wetland into one of the five classes described below (see **Appendix G** for the excerpt from *UDOT Report No.UT-06.12 Selecting a Wetland Classification*, which defines these five types). The five wetland classes found in Utah include:

- Riverine
- Slope
- Depressional
- Mineral Flat
- Lacustrine

Each class has a unique assessment form that is then used to further describe the assessment area (AA) and its inherent functions and values. Each of the eleven functions is put in a descriptive category of low, moderate, or high, which is associated with a weighted point value. Point values on a scale of 0.1 (lowest) to 1 (highest) are tallied and accumulated, resulting in a final score measured as the percent total functional points (the two value categories, visual quality and recreation/educational potential, are not included in the scoring). Functional points are added and expressed as a percentage of the total, which is then used to place the wetland into one of the following five categories. The categories begin with whether special status species habitat is provided, and then proceed in a decreasing order of relative importance given the factors considered in this method.

- Red Flag Category – for AAs containing special status species or habitat.
- Category I – the highest overall ranking. These wetlands are of exceptionally high quality and are generally rare or uncommon, or are important from a regulatory standpoint.
- Category II – wetlands that are more common than Category I wetlands. They are identified as providing habitat for sensitive species of plants and animals, or are unique in a given region.

- Category III – wetlands that are more common, generally less diverse, and often smaller and more isolated than Category I and II wetlands.
- Category IV – wetlands that are generally small, isolated, and lacking vegetative diversity. They are usually directly or indirectly disturbed.

Separate data forms may be used for each wetland, or AA, or areas may be combined on one form based on similarities such as size, species compositions, and exposure to disturbance. A sample of the functions and values assessment forms for each of the wetland classes identified in the project area (Riverine and Slope) are also included in **Appendix G**. Data collected at each wetland sample plot was used to evaluate functions and values of the project area on the assessment forms.

5.0 RESULTS AND DISCUSSION

This section provides a draft map of the wetlands delineated within the project area based on the methodology detailed in Section 4. Information collected from various agencies outlined in Section 3 was also used in the delineation effort. Parcels identified on maps as delineation not performed were not included due to lack of property access. The Draft Wetland Delineation Map (**Figure 17**) is not considered to be the jurisdictional determination until it is confirmed by the USACE.

For discussion purposes, the draft wetland delineation has been shown on a series of maps, displayed in **Figures 10-16**, with a mapbook index shown in **Figure 9**. Within each figure, ownership parcels are identified. Draft wetland delineation acreages for each parcel are reported in **Table 8. Appendix J** contains sample plot photos. The sample plot field forms entitled "Data Form Routine Wetland Determinations" are presented in **Appendix K.**

5.1 Draft Wetland Delineation

A total of 493.6 acres of wetlands were delineated within the project area during the draft delineation effort using the USACE Routine Wetland Delineation Method. This amounts to 26 percent of the total project area. A final determination of jurisdictional status will rely on further review by the USACE, which may require some areas to be revisited in the spring of 2008 depending on ability to confirm the hydrologic influence.

One large wetland area was delineated that encompasses the entire Lower Silver Creek floodplain within the project area from north to south, with small exclusions for roads, the Rail Trail, and remaining tailings piles. Here, the valley bottom is dominated by Baltic rush, which obtains 100 percent cover throughout the majority of this area. This draft wetland delineation characterizes the floodplain of Lower Silver Creek as a palustrine emergent, persistent to non-persistent semi-permanently to seasonally flooded wetland community (Cowardin 1979).

Some areas within the Lower Silver Creek floodplain that occur near existing tailings piles were not delineated as wetlands. Although the dominant wetland species, Baltic rush, is well established in many of these areas, hydric soil development was often not evident. These areas were often slightly higher topographically than surrounding areas that showed evidence of hydric soils. The presence of oxidized and compacted tailings waste in the soil profile affected the determination of soil characteristics. The deposition of the mine tailings, often heavy in iron, made evaluation of natural soil development problematic. Evaluation of hydric soil indicators, specifically iron oxidation, was misleading at times; as it was difficult to differentiate between iron oxidation resulting from anaerobic conditions or that resulting from the presence of mine tailings. Furthermore, much of the natural stratification of the soil profile has been disrupted and contained visible depositional layering.

These conditions and the associated tailings occurred primarily in the middle-southern section of the project area (**Figures 10, 11, and 12**). Gray sandy tailings accumulations also occurred throughout the northern half of the Lower Silver Creek project area, both as buried and surficial depositions. Tailings piles found on the surface were marked by GPS in the field and clipped out of the draft wetland delineation maps. Tailings accumulations found in the soil profile did not qualify the site as meeting the criteria for a wetland determination.

Grazing impacts confounded wetland boundary determinations further. Some areas were difficult to delineate due to a lack of vegetative stalks or seed heads used in species

identification. The associated compaction of soils also made digging to a required depth difficult. Recently grazed areas were found in the main floodplain to the north of the industrial area. Remnants of tailings piles and concentrations of orange soil were also evident in the profile. Effects of grazing were also seen throughout the north-east side of the project area. Wetland boundary assessments in these areas often relied on the dominance of sedges, identified by the remaining bases of plants, a thick undecomposed organic horizon, and drainage patterns.

The draft wetland delineation along the east side of the project area includes spring and seep fed drainages and meadows mixed with upland communities. Determining the hydrologic source for these inclusions proved challenging, as some areas appeared to derive a primary water source from irrigation canals or seepage linked to the G.M. Pace Ditch. The majority of Lower Silver Creek flow is diverted into this ditch from a diversion structure at the southernmost end of the project area. Draft wetland delineation determinations relied on the presence of hydric soil indicators, hydrophytic vegetation, and connectivity to Lower Silver Creek. Further discussion of specific areas is found below in the section describing results by ownership parcels.

5.2 Waters of the US/state

Total estimated waters of the US equaled 15.8 miles or 80,604 feet. Non-wetland waters of the US equaled 4.1 miles or 13,846 feet (**Table 9**). Determinations were made using existing vegetation, entrenchment, and connectivity.

5.3 Function and Values Assessment

Wetland characteristics of two wetland classifications were found in the Lower Silver Creek project area, riverine and slope. The function and values assessment classified 402.7 acres as riverine wetlands and 83.3 as slope wetlands (**Figure 7** and **Table 10**). The slope and riverine wetlands of the Lower Silver Creek drainage were found to be Category III wetlands.

5.4 Discussion of Delineation Considerations

Issues encountered during field work associated with marking wetland boundaries were discussed during a September site visit with Mr. Hollis Jenks, a USACE representative. These issues included:

- Source of hydrology – irrigation induced versus naturally occurring wet meadows
- Extent of Baltic rush as a primary wetland indicator along community edges
- Sites with grazed vegetation and compacted soils where majority of flow has been diverted
- Remnants of tailings accumulations in soil profile
- Existing tailings piles
- Seasonality of delineation and dryer annual conditions

Locations visited included some pastures along the eastern side of the project area, which may obtain a hydrologic source from anthropogenic means. Also discussed was the possibility of encroachment of Baltic Rush beyond wetland edges, possibly influenced by grazing, and the difficulty in identifying hydric soil indicators in compacted or tailings-influenced soils. Informal soil pits were dug in several locations during the site visit to investigate depths of horizons with high amounts of undecomposed organic matter, and the appearance of mottles versus tailings accumulations.

5.4.1 Hydrology

Irrigation use in the project area (**Figure 17**) has altered the natural hydrologic flow and has also likely altered the associated vegetation and soils. The primary diversion structure of Lower Silver Creek occurs immediately up stream of a clump of dead willows along the southern edge of the project area next to Highway 248. Water diversions have changed both surface flow and water table levels in the valley bottom. Also, irrigation practices themselves have changed recently, altogether ceasing in some areas. Detecting hydrologic indicators in the field was also challenging due to recent regional precipitation patterns and the seasonality of the delineation event, resulting in dryer than average conditions.

Data regarding water rights and points of use were included in this report to assist in making determinations in areas influenced by irrigation practices. It appeared that irrigation practices are not as extensively used as they once were in the project area. This reduced and/or discontinued use of the irrigation system presents two problems across the project area with respect to this delineation. First, it likely returns a significant portion of flow to the Silver Creek wetland complex, which was not necessarily evident at the time of the delineation. Second, the irrigation ditches supported many upslope seep wetlands.

It can be assumed that the vegetation and soils would adjust accordingly to these changes in hydrology over a few years. However, evaluating the current status of the changes to wetland adaptation only one or a few seasons after alterations in management practices is difficult. Hydrophytic vegetation has often persisted, while hydric soil indicators have become less apparent. Throughout the project area, presence of wetland hydrology was primarily indicated by drainage patterns, and occasionally seen by the occurrence of oxidized root channels in the upper 12 inches of the soil profile.

Hydrologic sources tied to irrigation practices pose a challenge to deciphering wetland boundaries. Lower Silver Creek is diverted at the southern end of the project area boundary along the east-side into the Pace ditch. Further north, it is also fed by Homer Spring, another perennial source. Factors affecting whether this ditch qualifies as a jurisdictional water of the US include the amount of diverted flow carried, its origin, and whether the excavated area through which the ditch passes naturally exists as an upland. Although concentrated areas of hydrophytic-dominated vegetation occur in these pastures, hydric soil characteristics are often weak or lacking. Determining sources of wetland hydrology may require further investigation during spring snowmelt and precipitation events, and the initiation of the subsequent irrigation season. The placement of piezometers consistent with USACE standards was also discussed with the USACE representative during the September field visit as a means to obtain additional information to help determine the primary hydrologic source. This remains an option should jurisdictional determinations in specific areas require further support. Our final delineations presented here were based on dominance of obligate and facultative wetland vegetation, topographic position and drainage characteristics, hydric soil indicators where possible, and professional experience.

5.4.2 Vegetation

The majority of the wetland plots were dominated by facultative wetland species (FACW) such as Baltic rush; however, some obligate species were recorded as well. Obligate species recorded in plots included blue-joint reed-grass (*Calamagrostis canadensis*), sandbar willow (*Salix exigua*), clustered field sedge (*Carex praegracilis*), Nebraska sedge (*Carex nebrascensis*), water sedge (*Carex aquatilis*), least spikerush (*Eleocharis acicularis*), large-leaf avens (*Geum macrophyllum*), common canary grass (*Phalaris arundinacea*), silverweed

(*Potentilla anserina*), arrowleaf groundsel (*Senecio triangularis*), seaside arrow-grass (*Triglochin maritimum*), and broad-leaf cattail (*Typha latifolia*).

Weeds, including noxious and/or invasive species, within the project area included musk thistle, (*Carduus nutans*), corn chamomile (*Anthemis arvensis*), yellow toadflax, (*Linaria vulgaris*), poison hemlock (*Conium maculatum*), isolated bindweed (*Convolvulus arvensis*), prickly lettuce (*Lactuca serriola*), Canada thistle (*Cirsium arvensis*), bull thistle (*Cirsium vulgare*), and cheat grass (*Bromus tectorum*). Other weed species observed but generally not as invasive included yellow sweetclover (*Melilotus officinalis*), wooly mullein (*Verbascum thapsus*), common dandelion (*Taraxacum officinale*), common sow thistle (*Sonchus oleraceus*), and curly dock (*Rumex crispus*).

A list of plant species documented within the project area is included in **Appendix I.**

Challenges were found in areas comprised of a mixture of wet meadow plants, such as sedge species, and upland grasses. Likely due to seasonal irrigation practices, this mosaic of hydrophytic and non-hydrophytic vegetation made absolute demarcations difficult. Field crews relied on support by soils, evidence of hydrology, and professional judgment in these areas.

Baltic rush, a generalist wetland species that is relatively drought tolerant, has persisted and even proliferated through phreatophytic, rhizomatous growth. As a result, with respect to the USACE wetland delineation methodology, some wetland areas exhibit hydrophytic vegetation occurring within soils that may have historically been hydric, and may currently exhibit residual hydric soil indicators, but which no longer receive the hydrologic regime necessary for qualification as a jurisdictional wetland. These conditions are complicated further due to the late season timing of the wetland delineation, and the low precipitation of the current year.

5.4.3 Soils

Although the Kovich component of the Wanship-Kovich loams map unit is listed as a hydric soil of Utah, soil profiles within Wanship-Kovich soils did not meet the taxonomic description of this component. However, descriptions did follow those for the Wanship type. Soil profiles recorded in sample plots were often not textbook examples of wetland soils. A primary wetland indicator of a non-sandy soil requires greater than 50 percent by volume of the upper 32 inches of soil to be composed of organic soil material, or the existence of a histic epipedon (USACE 1987). Upper organic horizons were seen to vary in depth, not always reaching the defined minimum depth of eight inches to qualify as a histic epipedon. This could be attributed to the agricultural history, irrigation diversion practices, and seasonally dry climate of the area.

Profiles viewed and determined to qualify as a wetland soil typically contained a thick epipedon of undecomposed organic material. Other determining factors included low-chroma colors and/ or the presence of mottles. Differentiating mottles from residual tailings deposits or those resulting solely from flood irrigation was often difficult. Also, soils along the main channel, especially in the wetlands north of and immediately south of Promontory Road, included pockets of sandy tailings deposits with no profile development. Evidence of reduced soil conditions were tested on the first day of field work using the alpha-alpha dipyridyl test. It was periodically used throughout the field sampling effort, however, it was not relied on for making final determinations, as either the solution itself became inactive, or site conditions were not conducive to its use.
Soils sampled in the project area typically fit descriptions given for the soil map unit. **Table 7** lists plot numbers found in each mapped soil type.

5.5 Draft Delineated Wetland Areas by Ownership Parcel

Draft wetland delineation results are reported by land ownership parcel. Acreages and descriptions are given beginning at the southern end of the project area and moving north (see **Figures 10-16**). A mapbook index is provided in **Figure 9**. Final delineation to be determined following review by the USACE.

5.5.1 Map 1

SS-65-A-6 (RDB LLC. R.D. Burbidge) – Boundaries of the 6.72 acres of wetlands identified in this parcel are clearly defined by vegetation, soils, and the presence of standing water. The wetland area is bounded by the main irrigation ditch along the east side and spans westward to the Rail Trail. The primary diversion of Lower Silver Creek is adjacent to this property's southern side. Wetland sample plots 7 and 8 were located within this parcel. Vegetation in Plot 7 included 100 percent dominance by common canary grass, a wetland obligate species. Soils included a thick surface layer of undecomposed organics with gleying and mottling occurring deeper in the profile.

Vegetation differs in Plot 8, but is still dominated by hydrophytes. Baltic rush, poison hemlock, and Nebraska sedge comprise 95 percent of vegetative cover. Hydric soil characteristics included low-chroma colors and a thick layer of undecomposed organics below the surface.

Approximately 1,150 feet of waters of the US were mapped in this parcel. Other wetland species found in this parcel included water sedge and sandbar willow.

SS-65-1 (Utah Power & Light) – This parcel contains 1.4 acres of wetlands and approximately 133 feet of waters of the US. It is a continuation of the same wetland community as in the adjacent parcel SS-65-A-6. The main irrigation ditch borders the east side between the wetland and the upland.

SS-65-A-5 (RDB LLC. R.D. Burbidge) – This parcel contains 9.4 acres of wetlands, and includes Plot 6. Vegetation is a mix of Baltic rush, red top, sandbar willow, common canary grass, and showy milkweed (*Asclepias speciosa*). The soil profile felt damp and contained large amounts of undecomposed, fine roots and slight gleying. Orange patches of tailings deposits were mixed throughout. Waters of the US were mapped as totaling 2,360.1 feet.

SS-65-A-7 (Lacy Limited Liability Co) – This parcel includes a tributary drainage that originates from a spring on the west side of US Hwy. 40. It includes 0.6 acre of wetlands. Soils here were saturated and marked with hummocks at the time of field work.

SS-64-1000-UP-X (UDNR/ Parks) – This parcel extends along both sides of the Rail Trail and continues onto Map 2 (**Figure 11**). It is mapped as containing 12.3 acres of wetlands and 2,869 feet of waters of the US. Irrigation ditches, which either contained water during the delineation effort or showed signs of recently carrying water, occur along both sides of this portion of the Rail Trail. Plot 11 captures typical characteristics of the parcel. Hydrophytic vegetation species included Baltic rush, large-leaf avens, field mint, Hooker's evening primrose, and western polemonium. The soil profile contained a thick surface horizon of undecomposed organics and a low chroma color. Mottles and gleying were found in the deeper clay layers. Also, the soil was wet during sampling.

Sample plot 10 is located on the parcel boundary between SS-64-1000-UP-X and SS-65-1. Although dominated by Baltic rush, this area appeared dryer and topographically higher than surrounding wetland communities. Also, disturbance associated with the power line or adjacent industrial area activities has altered the site. The soil pit revealed fill material. It also seemed to lack hydrology. The dominance by Baltic rush, but the lack of strong indicators of soils or hydrology is typical of the western boundary throughout this portion of the project area.

SS-65-A-3 (Stoly Associates, LLC.) – This parcel includes 1.8 acres of wetlands. Vegetation was dense throughout this southwest corner of the project area. Plot 9 recorded up to 50 percent cover by Baltic rush, and 15 percent cover of both large-leaf avens and poison hemlock. The soil test pit contained upper horizons with high concentrations of undecomposed fine roots, oxidized root channels, and low-chroma colors.

SS-65-A-3-1 (Forestdale Investments, LLC.) – This long, slender-shaped property occurs between the adjacent west-side upland and the lower-lying floodplain of Lower Silver Creek. It has been mapped as containing 0.67 acres of wetlands.

SS-65-B (Geneva Rock Products) – This parcel contains 0.5 acre of wetlands in its eastern-most corner. The boundary was placed by using knowledge of the similar adjacent area and existing vegetation.

5.5.2 Map 2

SS-64-A Fausett Trustee (Alain Balmanno, Esq.) – This is a large parcel shown across both Maps 1 (**Figure 10**) and 2 (**Figure 11**). It includes 25.4 acres of delineated wetlands, and 3,468 feet of waters of the US. Homer Spring is located on this property. The near-by water rights point of diversion, 35-8829 owned by Utah State Parks and Recreation, uses water from this spring for domestic, irrigation, and other purposes. The central portion of this parcel lying west of the Rail Trail contains several tailings piles. This was one of the challenging areas with respect to deciphering wetland characteristics, as it had been heavily grazed, resulting in compaction and loss of identifiable vegetation, in addition, the soil profile contained iron inclusions from tailings deposits. The original Lower Silver Creek channel has been diverted by the east side irrigation system, leaving residual topography of the dry creek bed. Seasonal ponding and saturation likely still occur in this area, however, water is also directed artificially and delivered through irrigation ditches as needed following spring run-off. This was one area discussed during the site visit by Tetra Tech biologists and the USACE representative. It was agreed during this meeting that primary delineation determinants would include the presence of a thick upper horizon of undecomposed organic material and low-chroma colors in the soil profile, and the dominance of hydrophytic vegetation. These factors resulted in the delineation presented on **Figures 10** and **11**. A transect of sample plots was placed across this parcel to discern upland and wetland communities (plots 23-28).

Placing sample plots from east to west, biologists identified a strip of wetland area adjacent to the Rail Trail (plot 23), but the next successive sample plot (Plot 24) did not support wetland characteristics. While vegetation was dominated by hydrophytes, the soil profile lacked sufficient development to meet hydric criteria. The area also appeared slightly higher topographically than land to the east and further west. The soil profile in Plot 25 revealed high concentrations of organic material, low chroma color, and slight mottling. Plots26 and 27 included tailings in the soil profile and topographic remnants of the stream channel. Both plots were dominated by Baltic rush with some redtop. Plot 28 continued to meet all three wetland criteria. The vegetation was dominated by Baltic rush, redtop, and Nebraska sedge, drainage

patterns were evident, and the soil profile included low chroma colors and signs of reducing conditions. The western boundary was delineated based on a loss of these characteristics.

Also within this parcel on the west side is a tributary to Lower Silver Creek that originates outside of the project area from a spring. The upper section of this tributary is included in the project area as parcel SS-65-A-7. Several small seeps contribute to this wetland within parcel SS-64-A, and the ground was saturated at the time of field work. Boundaries were delineated based on abrupt visual differences in hydrophytic and upland vegetation and the presence of saturated soil.

Along the east side of the southern end of this parcel, a thin strip of wetlands has been mapped between the Rail Trail and the confining toe-slope of the adjacent upland. Plot 37 marks the eastern-most edge. Vegetation here is dominated by the facultative wetland species Baltic rush and foul bluegrass. The soil profile included organic matter and low chroma colors. Homer Spring is located to the south.

The eastern-side wetlands between the Rail Trail and the Pace canal within this parcel and to the north, were also discussed with the USACE. This area contains a mix of wetlands and irrigated pastures, some of which originally existed as wetlands and some of which appear to be irrigation-induced. However, given that the Pace Ditch carries the majority of Silver Creek, and that hydrophytic vegetation is dominant, wetland areas have been delineated. It is important to note that hydric soil characteristics are weak in areas. Typical conditions in these east-side wetlands include a vegetation composition of both wetland and upland species, and soils which often do not appear to be hydric.

SS-56-A (Nadine Gillmor) – A total of 11.7 acres of wetlands were delineated in this parcel. The majority of this acreage occurs west of the Rail Trail in the valley bottom. A long, thin polygon occurs along the eastern side, which connects with similar wetlands delineated in the adjacent SS-64-A parcel. A total of 1,170 feet of waters of the US have been mapped in this parcel, consisting of the Pace Ditch.

This parcel had been heavily grazed at the time of field work, however; the site contained 80 percent cover by Baltic rush and the characteristic bright green remnants of Nebraska sedge, thus meeting the wetland criteria for vegetation. Hydrologic drainage patterns, mottles, and low chroma color satisfied the soils criteria.

Further north within this parcel, Plots 39 and 40 did not meet all three criteria for a wetland. Although vegetation in Plot 39 was dominated by Baltic rush, both hydrology and soils were lacking. Horizons showed low chroma colors, but a thick O-horizon was not found, nor was the presence of mottles. This area was noted as heavily grazed. Plot 40 had more hydrophytic vegetation, a 50-50 mix of Baltic rush and Nebraska sedge, and also showed hydrologic signs of drainage patterns. However, the O-horizon was only two inches thick. Mottles were not found, and a trial of the alpha-alpha dipyridyl test was negative (however, reliability of the solution at this time was not certain). Wetland boundaries were placed by following the line of hydrophytic vegetation and also digging several informal test pit to examine soil properties.

Across the Rail Trail within this same parcel, Plot 38 was placed in an area dominated by Baltic rush. However, hydrology and soils did not support wetland criteria. This area is an example where the Baltic rush, which is not preferred by livestock, may gain dominance through selective grazing and its phreatophytic nature to spread rhizomatously. This east side contains both naturally occurring wetlands in low-lying areas mixed with irrigated pastures on alluvial fans

stemming from failures and outlets in the large, east-side irrigation ditch. Please refer to the general wetlands results discussion at the beginning of this section for further information concerning the delineations made along the eastern side of the project area.

5.5.3 Map 3

SS-56-A-1 (E. L. Gillmor) – This parcel contains 43.9 acres of wetlands throughout the valley bottom; bounded on the west side by the break in Baltic rush, and on the east by the Rail Trail and inclusions of sagebrush-dominated upland. The parcel also contains 4,902 feet of waters of the US, including the continuation of the east-side main irrigation ditch. Plot 49 exhibits another area with a questionable hydrologic source located adjacent to the east-side ditch. Vegetation is a mix dominated by clustered field sedge and Nebraska sedge, both wetland obligates, meadow barley (*Hordeum brachyantherum*), a facultative wetland species, and timothy grass (*Phleum pretense*) and trailing fleabane (*Erigeron flagellaris*), both upland species. Hydrologic patterns are evident in that a pattern of bright green vegetation, dominated by hydrophytes, extends outward from the ditch in an alluvial fan formation. Also, mottles are present in the soil profile. However, the site appeared dryer than normal to support the hydrophytes. It was questioned whether irrigation practices or a leaking ditch has induced wetland conditions. If so, have these practices recently changed, leading the site to revert back to upland characteristics, or is it simply related to the time of year. Wetland delineations followed the visible change in vegetation between strong hydrophytes such as sedges and upland species such as slender wheatgrass (*Agropyron trachycaulum*). Determinations in this area may require the site to be revisited during wetter, spring conditions.

SS-56-UP-X (UDNR/ Parks) – This parcel encompasses the Rail Trail and includes 3.9 acres of wetlands and 3,329 feet of waters of the US. Several ditches, culverts, and points of diversion exist along this raised rail bed and are shown in **Figure 17**.

5.5.4 Map 4

SS-56 {F.J. Gillmor (Lindsay Ford, Esq.)} – Extending from Map 3 through Map 4, 57.1 acres of wetlands and 7,211 feet of waters of the US are contained in this parcel.

SS-50 {F. Gillmor (Lindsay Ford, Esq.)} – A total of 40.4 acres of wetlands and 7,723 feet of waters of the US have been mapped in this parcel (Map 4, **Figure 13**). Two primary wetland areas exist; the valley bottom dominated by Baltic rush, and the east-side pastures. A comparison of Plot 31 and Plot 32 captures the subtle differences found along this eastern slope, where a mosaic of wetland vegetation and upland grasses co-occur. Vegetation in sample plot 31, located in adjacent parcel SS-56, was dominated by Baltic rush and clustered field sedge. Soils showed definite hydric characteristics, with a thick upper horizon of organic material, low chroma colors, oxidized root channels, and common, distinct mottles. Plot 32, included vegetation dominated by Nebraska sedge, but lacked the strong hydric soil development. Although exhibiting low chroma colors, an organic layer was not well-developed, and redoximorphic features were not detected. The main east-side ditch traverses both of these parcels. Based on soil development, it appears that Plot 31 exhibits a naturally occurring wetland, but plot 32 reflects irrigation- induced conditions.

SS-51-UP-X (UDNR/ Parks) – A total of 1.2 acres of wetlands and 1,886 feet of waters of the US occur along this Rail Trail parcel. Wetlands occur surrounding culverts and in low-lying areas between the rail bed and adjacent pastures.

SS-47 (Lindsay Ford, Esq.) – This parcel includes 17.1 acres of wetlands, delineated along the west side of the project area by a break in the Baltic rush dominated, low-lying land and the upland toe-slopes. Several shallow, soil test pits were sampled along this edge to note where characteristics such as a thick, dark organic horizon changed to a dryer, lighter A-horizon. Approximately 578 feet of waters of the US, and 4,199 feet of non-wetland waters of the US were mapped in this parcel.

SS-49 (Angus and Ella Pace) – A total of 21.6 acres of wetlands, dominated by Baltic rush, redtop, and blue-joint reed grass were mapped in this parcel. A dry ditch along the Rail Trail resulted in approximately 66 feet of non-wetland waters of the US.

5.5.5 Map 5

SS-44 (Pace Family Investments, LLC) – Extending across Promontory Road throughout the Lower Silver Creek floodplain, this parcel contains 67.3 acres of wetlands and 8,461 feet of waters of the US. As shown in **Figure 14**, some large tailings piles were excluded from the acreage estimate. Plots 45, 46, and 47 were taken in this parcel. The main Lower Silver Creek floodplain here is dominated by Baltic rush, with abundant mottles in the soil profile. Although residual tailings likely contribute to the amount of oxidation seen, the soil was moist at four inches below the surface. Plot 46 exhibits conditions of the tailings piles; void of vegetation, hydrologic indicators, and a profile of sand to a depth of greater than 20 inches. Topographically, the plot is equal to surrounding wetlands, however, the soils are dramatically different and the area does not appear to function as a playa or dried vernal pool. Towards the edges of the valley bottom, vegetation gradually changes to a mix of Baltic rush, redtop, and blue-joint reed grass.

SS-45-UP-X (State of Utah) – This parcel along the Rail Trail does not include any wetlands. Irrigation ditches along the rail bed that supported hydrophytic vegetation were mapped as waters of the US, totaling 254 feet. Where the vegetation within the ditch changed to upland species, non-wetland waters of the US were mapped, totaling 227 feet. It was assumed that those ditches which showed signs of recently or regularly carrying water, and that were connected to the larger, main irrigation ditch or another hydrologic source were considered waters of the U.S.

SS-51-A (Angus and Ella Pace) – This parcel contains 4.2 acres of wetland, continuing from that delineated in SS-49 to the south and SS-51-C-2-X across the Rail Trail to the east.

SS-51-C-2-X (South Summit School District) – This parcel is comprised of two areas separated by the Promontory Road. The piece that extends south from the road to the east side of the firehouse encompasses a relatively large drainage in its southernmost end that connects under the Rail Trail to the Lower Silver Creek valley bottom.

North of Promontory Road, a culvert connects the east-side ditch to this naturally occurring low-lying area. In this parcel, the vegetation is a mixture of sagebrush-dominated upland surrounding a mosaic of obligate, facultative wetland, and facultative upland species. At Plot 34, boundaries were established by following the change in species composition, in particular, following the demarcation between a mix of Baltic rush, Nebraska sedge, and pullup muhly (Muhlenbergia filiformis), and the topographically higher positioned sagebrush (*Artemisia* sp.). After testing for hydric soil characteristics at this plot, the soils did not support the existence of saturated conditions. This could be attributed to insufficient duration of saturated conditions. A combination of micro-topography, hydrophytic vegetation, and a relatively deep layer of organic

material was primarily used to delineate wetland areas associated with this small drainage channel that passes through this parcel and connects to the wetter palustrine emergent meadow to the north. The connection to the hydrologic source could be questionable, as the east-side ditch occurs within an upland community south of Promontory Road. Jurisdictional determination of the ditch will affect this area's current delineation. Although drainage patterns satisfy the criterion of hydrology, whether this ditch is considered a waters of the US will affect whether the connection would qualify this area as a wetland, or whether it would be considered an isolated wetland. External to the project area, Pond 8797 (**Figure 4**) may contribute additional flow.

Wetlands mapped in both pieces of this parcel total 5.3 acres, with 3,371 feet of waters of the US and 189 feet of non-wetland waters of the US.

SS-51-C (Pivotal Promontory LLC) – A small piece of wetlands (0.11 acre) occurs in the southern tip of this parcel, with 171 feet of waters of the US.

SS-57-1 Property Reserve, Inc. (E.Christensen) – A small piece of wetlands (0.04) occurs in this west-side parcel.

5.5.6 Map 6

SS-28-A-X (Municipal Building Authority of Park City) – This parcel encompasses the majority of the Lower Silver Creek valley bottom north of the Promontory Road. It includes 50.3 acres of wetlands, primarily dominated by Baltic rush. This parcel also contains 6,952 feet of waters of the US, primarily comprised of the stream channel. Isolated tailing piles occur in this parcel.

SS-29-B-X (Snyderville Basin Water Reclamation District) – Situated along the west edge of the project area, this parcel contains 0.15 acre of wetlands dominated by Baltic rush.

SS-30-A (Silver Creek – Robert Larsen Investors) – Only 0.01 acre of wetland is contained in this west-side parcel.

SS-44-A-1(Pivotal Promontory LLC) – This parcel contains the Promontory Road easement and contains 1.6 acres of wetlands.

SCO-C-AM-6 – This thin parcel along the west side contains 0.5 acres of wetlands.

SCO-C-AM-6-A-X (Summit County A Municipal Corp) – This parcel exists along the west side and contains 0.5 acres of wetlands.

SS-28-A-1-X (Park City) – This parcel and the adjacent one labeled as "Multiple" ownership exist as a large complex of slope wetlands along the eastern side of the project area. A system of irrigation ditches occurs throughout and most of the area is used as cow pasture. The wet, low lying area immediately south of the secondary access road had cows in it at the time of the survey. The pasture in the southern end of this parcel includes a low-lying, seep-fed wetland meadow that drains under the Rail Trail via culverts and connects to Lower Silver Creek through parcel SS-29. A total of 14.2 acres of wetlands, 4,262 feet of waters of the US, and 914 feet of non-wetland waters of the US have been mapped.

Multiple – This parcel is owned by several entities, and includes 26.7 acres of wetlands, 7,464 feet of waters of the US, and 973 feet of non-wetland waters of the US. Several shallow,

informal soil test pits were dug along transitional areas to determine where hydric soil indicators weakened. Delineations followed this as well as visual changes in vegetation composition.

SS-28-UP-X (UDNR/ Parks) – This Rail Trail parcel includes 4.6 acres of wetlands, and 41 feet of waters of the US. A pond occurs along the west side of the rail bed (number 8802, **Figure 4**). Plot 1 was placed within this parcel along the east side of the trail.

SS-29 (Angus and Ella Pace) – This parcel includes a small drainage entering from the east, which passes under the Rail Trail via a culvert, as well as a large portion of the main valley bottom of Lower Silver Creek. Wetland vegetation includes areas with 100 percent dominance by Baltic rush, as well as mixtures of Baltic rush, redtop, and blue-joint reed grass. Delineated acreage totals 56 acres, with 9,176 feet of waters of the US, and 1,618 feet of non-wetland waters of the US. Sample plots include 42, 43, 44 and 48.

The drainage entering from the east side is fed by several seeps occurring in parcel SS-28-A-1-X. The large portion within the valley bottom spans a secondary access road and includes outflow from the Snyderville Basin Water Treatment Facility.

5.5.7 Map 7

SS-29-X (State Road Commission) – This parcel is situated at the northern end of the main Lower Silver Creek valley bottom. It has been mapped as containing 1.09 acres of wetlands and 361.2 feet of waters of the US.

SS-21-UP-X (State of Utah) – This is the northern-most parcel along the Rail Trail. It includes 1.5 acres of wetlands and 673 feet of waters of the US.

Easements for US Interstate 80, Highway 40, and Highway 248 are included as separate parcels. Associate wetland acreage includes: I-80 (3 parcels: 0.95, 2.1, and 0.03 acres; and, 388, 45 feet WUS); Highway 40 (2 parcels: 0.0, 0.05 acres).

6.0 CONCLUSION

This draft wetland delineation of the Lower Silver Creek project area mapped 493.6 acres of wetlands. Wetland communities consisted of palustrine emergent meadows and a spring-fed tributary drainage. This acreage amounts to approximately 26 percent of the Lower Silver Creek project area. A total of 80,604 feet, or approximately 15 miles of waters of the US were mapped, comprised of Lower Silver Creek and associated irrigation ditches.

Delineations were based on the presence of the three wetland criteria: hydrophytic vegetation, hydric soils, and hydrology. Wetlands found within the valley bottom typically showed strong characteristics in all three categories; however, in some areas, hydric soils and/or the source of hydrology was questionable. Historic and current irrigation practices have influenced the wetland communities present today. The diversion of Lower Silver Creek has altered the hydrologic regime and hydric soil indicators, particularly in the south-central portion of the project area. Concentrations of tailings in the soil horizons also made deciphering hydric soil indicators challenging.

As previously mentioned, several irrigation diversions depart from the wetland at various locations, mostly restricted to the southern end of the complex. With the exception of the main east-side ditch, most irrigation ditches were not running at the time of the delineation. There were many instances across the Silver Creek complex where wetlands occurring in association with the irrigation harbored both obligate wetland plant species and upland species. It may be assumed that in some areas the obligate species are residual and the upland are newly established.

While hydrology was difficult to evaluate, many of the soils proved to be atypical and equally difficult. As previously mentioned it is believed that many of the soils are demonstrating residual and/or irrigation-induced hydric soil indicators, evidenced by their subtle and minor occurrences. A thick epipedon of undecomposed organic material set hydric soils apart from those primarily influenced by an irrigation source of hydrology.

Much of the Silver Creek wetland complex was historically disturbed by mining activities. Tailings piles were not included in the delineated areas. Mechanical removal of these piles, which occur in low-lying areas of the floodplain, may change the topography enough to enhance wetland development.

Additions of irrigation water along the east side have likely both enhanced naturally occurring wet meadows in these pastures, as well as possibly formed concentrations of hydrophytic vegetation in non-hydric soils. This has resulted in a mosaic of upland and wetland communities separated by gradual boundaries. Hydrology in these areas is provided by springs, seeps, and the diverted portion of Lower Silver Creek. Thus, they may likely still meet the hydrologic criteria for jurisdictional determinations.

Based on the UDOT Wetland Functional Assessment Method, the riverine and slope wetlands of Lower Silver Creek were identified as Category III. Although assessment forms show some areas where a Category II rating could have been considered, the high level of anthropogenic influence in the project area resulted in a slightly lower rating. The method allows for use of the "evaluator's best professional opinion" in interpreting how functions are represented on the assessment forms. Factors contributing to this rating include the influence of irrigation, grazing, and historic uses of the project area.

The delineations presented here were based on dominance of obligate and facultative wetland vegetation, topographic position and drainage characteristics, hydric soil indicators where possible, and professional experience. A final determination of jurisdictional status will rely on further review by the USACE, which may require some areas to be revisited in the spring of 2008.

REFERENCES

Brooks, L. E., J. L. Mason, and D. D. Susong. 1998. Hydrology and snowmelt simulation of Snyderville Basin, Park City, and adjacent areas, Summit County, Utah. Utah Department of Natural Resources and United States Geological Survey, Technical Publication No.115.

Cowardin, L.M., F.C. Golet, and E.T. LaRoe. Classification of Wetlands and Deepwater Habitats of the United States. USFWS/OBS-79/31. December 1979.

Elliot, Sally. 1995. The Mines, the Mills, the Moguls. Copyright 2/26/95.

Natural Resources Conservation Service (NRCS). 2007. Utah Snotel Year-to-Date Precipitation Update Graph. http://www.wcc.nrcs.usda.gov/cgibin/precup-graph.pl?state=UT. Accessed 9/13/07.

National Wetlands Inventory Mapping Code Description. Wetland and Deepwater Habitats Classification. http://wetlandsfws.er.usgs.gov/NWI/webatx/atx.html. Viewed Oct 2007.

Stonely, T. 2004. Weber River Basin: Planning for the future. Utah Division of Water Resources. Public Review Draft. http://www.water.utah.gov/planning/waterplans.asp

Utah Division of Water Resources (UDWR). 2007a. Drought in Utah: Learning from the Past – Preparing for the Future. Utah State Water Plan. http://www.water.utah.gov

Utah Division of Water Resources (UDWR). 2007b. http://www.water.utah.gov/droughtconditions/AveragePrecipitation/default.asp. Accessed 9/18/07.

Utah Division of Water Rights. 2006. Hydrographic maps. http://www.waterrights.utah.gov/. 10/16/07.

Utah Division of Water Rights. 2007. http://www.waterrights.utah.gov/. 10/16/07.

USDA NRCS. http://soildatamart.nrcs.usda.gov/. Accessed August, 2007.

SGID AGRC (Utah's State Geographic Information Database). 2007. http://gis.utah.gov/content/view/85/79/. SGID_U024_Streams.

TABLES

Table 1. Soil Types

Map Unit Symbol	Map Unit Key	Map Unit Name	Acres in project area
102	508250	Ant Flat loam, 2 to 8 percent slopes	0.69
107	508147	Ayoub-Dunford-Melling complex, 15 to 30 percent slopes	87.51
108	508148	Ayoub-Dunford-Melling complex, 30 to 60 percent slopes	32.00
106	508146	Ayoub cobbly loam, 2 to 15 percent slopes	281.30
128	508174	Fewkes gravelly loam, 2 to 8 percent slopes	781.11
129	508173	Fewkes gravelly loam, 8 to 15 percent slopes	97.24
144	508190	Horrocks-Cutoff complex, 15 to 30 percent slopes	64.94
158	508202	Melling-Ayoub-Rock outcrop complex, 10 to 30 percent slopes	5.88
179	508222	Wanship-Kovich loams, 0 to 3 percent slopes	523.19

Table 2. NWI Acres by Wetland Code

CODE	System	Class	Class2	Regime	Special	Acres
PEMC	P	EM		C		138.7
U	U	''				15.2
PEMCh	P	EM		C	h	6.5
PUSA	P	US		A		4.2
PABFh	P	AB		F	h	1.1
PAB/EMF	P	AB	EM	F		1.0
PEMA	P	EM		A		0.8
PABFx	P	AB		F	x	0.8
PUSAh	P	US		A	h	0.3
PEMF	P	EM		F		0.2
					TOTAL	**168.7**

Table 3. Landowners by Parcel

Name	Entity	Lot No. (Acreage)
0	Qwest Corp	S-404 (2.89)
Standley Pace and Mike Pace	Standley B and Beverly F Pace	SS-22 (5.87), SS-28, PRIVTAX-7
Dwayne Pace	Pace Family Investments, LLC	SS-22 (5.87), SS-27 (115.08), SS-27-A, SS-28 (30.10), SS-44
Jeramy Green	Pivotal Promontory Development LLC	SS-23 (363.30), SS-51-C, SS-44-A-1
0	Mun Bldg Auth of Park City	SS-27-B-X (44.82), SS-28-A-X (49.13)
Jeff Schoenbacher, Ron Ivie, Tom Bakaly, Dana Williams	Park City	SS-28-A-1-X (39.13)
John Knudson	UDNR / Parks	SS-28-UP-X, SS-51-B-X, SS-51-UP-X, SS-56-UP-X, SS-64-1000-UP-X (4.21), SS-45-UP-X, SS-21-UP-X
(b) (6)	[redacted]	SS-29 (125.75), SS-44 (97.85), SS-49 (30.00), SS-51-A (15.34)
Mike Luers and Michael Boyle	Snyderville Basin Water Reclamation District	SS-29-B-X (11.20, 31.61)
	State Road Commission	SS-29-X, SS-31-X
Daniel J. Olabarri	Olabarri Investment Company	SS-30 (22.09)
Joe Tesch, Esq.	Silver Creek – Robert Larsen Investors	SS-30-A (146.86), SS-30-B (45.59), SS-32-B-1 (19.42), SS-43-B (4.87)
0	UDOT	SS-32-B-1-X (0.31, 0.49), SS-43-B-X (3.57, 0.03), SS-47-X (0.72), SS-48-1-X, SS-49-A-X, SS-56-A-1-X (2.14), SS-56-C-X (0.30), SS-57-1-X, SS-58-1-A-X (6.80), SS-65-A-X (69.80)
Samantha Graham	American Ins. Co. / Fireman's Fund Ins.	SS-32-B-3 (21.66)
0	Johnson International, Inc.	SS-44-B (4.31)
Lindsay Ford, Esq.	(b) (6)	SS-47 (159.28), SS-50 (130.00), SS-56 (131.23)
0	Park City Fire District	SS-51-C-1-X (1.75)
0	South Summit School District	SS-51-C-2-X (24.66)
0	(b) (6)	SS-56-A (50.61)
Alain Balmanno, Esq.	Fausett Trustee	SS-64-A (153.79)
(b) (6)	[redacted]	SS-56-A-1 (208.47)
Elliott Christensen	Property Reserve, Inc.	SS-57-1 (111.28)
0	Park City Auto Center	SS-65-1-A (2.79)
Mike Dalley	Jack B. Parson Companies	SS-65-3 (5.00)
Dick Burbidge	Burbs LLC	SS-65-A, SS-65-A-2-B (0.99)
0	BVD Properties LLC	SS-65-A-2 (0.08)
0	Byer Excavating Inc.	SS-65-A-2-A (2.00)
0	Stoly Associates LLC	SS-65-A-3 (7.68)
0	Forestdale Investments LLC	SS-65-A-3-1 (4.90)
Dave Burbidge and Troy Hardy	RDB LLC (Richard D Burbidge)	SS-65-A-5 (40), SS-65-A-6 (15.14), SS-65-A-2-B
0	Lacy Limited Liability Co	SS-65-A-7 (3.99)
0	Forestdale Investments LLC and Sundborn LLC	SS-65-A-8 (90.25)
0	Sundborn LLC	SS-65-A-8-A
Tony Christofferson	Geneva Rock Products, Inc.	SS-65-B (11.29)
0	Utah Power & Light	SS-65-1, S-303, SS-65-1-X
0	Jordanelle Storage Park, LLC	SS-65-2 (5.01)
0	Helene Barfuss, et al	SS-65-2-1 (4.69)
Kerry Gee	United Park City Mines	SS-88 (201.07)
	Summit County A Munic. Corp.	SCO-C-AM-6-A-X, SS-30-1-X (county road)
	Richard N Reese Family LP	SCO-C-AM-7B
	(b) (6)	SCO-C-AM-8
	Silver Creek Properties LLC	SCO-C-AM-9, SS-43-B-1 (25.46)

Table 4. Water Rights Point of Use.

Polygon ID	Water Rights Numbers	Acres
1	35-8820, 35-8968, 35-5706 (a16060), 35-5828 (a17205), 35-5842 (a17320), 35-10075 (a19202)	12.16
2	35-8820, 35-8968, 35-5706 (a16060), 35-5828 (a17205), 35-5842 (a17320), 35-10075 (a19202)	27.6
3	35-8820, 35-8968, 35-5706 (a16060), 35-5828 (a17205), 35-5842 (a17320), 35-10075 (a19202)	433.86
4	35-8820, 35-8968, 35-5706 (a16060), 35-5828 (a17205), 35-5842 (a17320), 35-10075 (a19202)	82.4
5	35-8820, 35-8968, 35-5706 (a16060), 35-5828 (a17205), 35-5842 (a17320), 35-10075 (a19202)	9.19
6	35-8820, 35-8968, 35-5706 (a16060) 35-5828, a17205, 35-5842, a17320, 35-10075, a19202	15.45
7	35-8818	2.84
	TOTAL=	583.5

Table 5. Water Rights Diversion Stations

Inside Project Area:

Station Identification Number	Station Name	Water Right Number
8886	1115 MOUNTAIN REGIONAL WELL 10	E4101=35-11015, a24206=35-10075
8781	0248 HOMER SPRING	35-8820
8782	0249 OLD SPLITTER	May cover 35-8820 (Silver Creek, Dorrity and Pace Springs), 35-8968 (seepage).
8783	0250 TEMPORARY DAM	May cover 35-8820 (Silver Creek, Dorrity and Pace Springs), 35-8968 (seepage).
8784	0251 IRRIGATION SOUTH TERMINUS	May cover 35-8820 (Silver Creek, Dorrity and Pace Springs), 35-8968 (seepage).
8785	0252 TEMPORARY DAM	May cover 35-8820 (Silver Creek, Dorrity and Pace Springs), 35-8968 (seepage).
8787	0254 TEMPORARY DAM	May cover 35-8820 (Silver Creek, Dorrity and Pace Springs), 35-8968 (seepage).
8788	0255 TEMPORARY DAM	May cover 35-8820 (Silver Creek, Dorrity and Pace Springs), 35-8968 (seepage).
8790	0257 IRRIGATION NORTHERN TERMINUS	35-8968, 35-8820
8792	0259 TURNOUT	35-8968, 35-8820
8802	0269 POND	none
8803	0270 USGS GAGE	none
8806	0273 TREATMENT PLANT DISCHARGE	none
8813	0280 POND	Standley Pace joint ownership 35-8968. Surface WRPOD in Section14. WR for irrigation.
8843	0310 POSSIBLE SPRING	none
8844	0311 PUMP	No water right in the name of the land owner within 1000ft of the pump.

Adjacent to Project Area:

8872	1101 MOUNTAIN REGIONAL WELL 15B
8873	1102 MOUNTAIN REGIONAL WELL 3
8779	0246 POND
8780	0247 POND
8796	0263 WOOD GATE
8797	0264 POND
8800	0267 STORMWATER POND
8801	0268 DISTRIBUTION POINT
8804	0271 GOLFCOURSE MAINTENANCE POND
8808	0275 TREATMENT PLANT WELLHOUSE
8812	0279 POND
8820	0287 POND

Table 6. Water Rights Points of Diversion within the Lower Silver Creek Project Area

FID[1]	WRNUM[2]	CHNUM[3]	Type[4]	St.[5]	Priority	Uses[6]	CFS[7]	ACFT[8]	Location	Owner	Source
0	35-10074		Sp	P	1861	I	0.12	31.6	S660 W560 NE 15 1S 4E SL	Mt Region Water Special Serv. Dist.	Silver Creek, Springs, Seepage
1	35-10074		Sp	P	1861	I	0.12	31.6	N660 W560 SE 10 1S 4E SL	Mt Region Water Special Serv. Dist.	Silver Creek, Springs, Seepage
2	35-10761		U	P	1875	O	0	1	N1550 W1303 SE 35 1S 4E SL	BVD Properties LLC	Underground Water Well
4	35-8829		Su	P	1882	DIO	0.033	0	S1800 W1600 NE 35 1S 4E SL	State of Utah Division of Parks & Rec.	Homer Pace Spring
6	35-10075	a21031	U	A	1997	M	0.4	104	N1350 W100 S4 22 1S 4E SL	Atkinson Special Service District	Underground Water Wells
7	35-10075	a24208	U	A	2000	M	0.4	104	N1350 W100 S4 22 1S 4E SL	Mt Region Water Special Serv. Dist.	Underground Wells (existing)
8	35-10075	a25258	U	A	2001	M	0	218	N360 W1930 E4 22 1S 4E SL	Mt Region Water Special Serv. Dist.	Underground Wells (9-existing)
17	35-7736	E1995	U	A	1981	O	0	1	N1500 E1320 S4 35 1S 4E SL	Burbidge Prop. Limited	Wanship Reservoir
34	35-9331	E2726	U	A	1990	O	0	1	N1500 E1320 S4 35 1S 4E SL	Hillcrest Investment Co.	Wanship Reservoir
36	35-9586	E3044	Su	A	1992	O	0	70	S2200 W900 NE 15 1S 4E SL	Gilbert Western Corp	Wanship Reservoir
37	35-11015	E4101	U	A	2001		0	372	N1350 W100 S4 22 1S 4E SL	Mt Region Water Special Serv. Dist.	Wanship Reservoir
38	35-11015	E4101	U	A	2001		0	372	N360 W1930 E4 22 1S 4E SL	Mt Region Water Special Serv. Dist.	Wanship Reservoir
	Terminated Status:										
3	35-5478		Su	T	1987	O	2	0	N1500 W1100 SE 15 1S 4E SL	Nordic Construction Company	Silver Creek
5	35-9020	a13254	U	T	1984	D	0	40	S150 E150 NW 23 1S 4E SL	Boyer Land Partnership	Underground Water Wells
9	35-4585	a29127	U	T	2004	M	0	61.6	N360 W1930 E4 22 1S 4E SL	Milton O. Bitner	Underground Water Wells (5)
10	35-10282	t20241	Su	T	1996	O	0	2	0 W700 NE 15 1S 4E SL	COP Construction	Silver Creek and Weber River
11	35-9435	t23266	U	T	1999	M	0	280	N360 W1930 E4 22 1S 4E SL	Atkinson SSD	Wells (3 existing, 2 new)
12	35-8425	t24655	Su	T	2000	O	0	40	S2000 W900 NE 15 1S 4E SL	(b) (6)	East Cnyn Crk & Silver Crk
13	35-9435	t25031	U	T	2000	M	0	280	N360 W1930 E4 22 1S 4E SL	Mt Region Water Special Serv. Dist.	Wells (3 existing, 2 new)
15	35-6973	E1596	U	T	1979	O	0	3000	S1500 W200 NE 27 1S 4E SL	Silver Creek Investor LTD.	Wanship Reservoir
16	35-6973	E1596	U	T	1979	O	0	3000	S200 W200 NE 27 1S 4E SL	Silver Creek Investor LTD.	Wanship Reservoir
18	35-7781	E2053	U	T	1982	O	0	7000	S1720 W20 N4 15 1S 4E SL	Daniel L.ET.AL. Shoell	Echo Reservoir
19	35-7781	E2053	U	T	1982	O	0	7000	N300 W1460 SE 15 1S 4E SL	Daniel L.ET.AL. Shoell	Echo Reservoir
20	35-7781	E2053	U	T	1982	O	0	7000	N1120 W1430 SE 15 1S 4E SL	Daniel L.ET.AL. Shoell	Echo Reservoir
21	35-7781	E2053	U	T	1982	O	0	7000	S750 W1290 E4 15 1S 4E SL	Daniel L.ET.AL. Shoell	Echo Reservoir
22	35-7781	E2053	U	T	1982	O	0	7000	S20 W1030 E4 15 1S 4E SL	Daniel L.ET.AL. Shoell	Echo Reservoir
23	35-7781	E2053	U	T	1982	O	0	7000	N1700 W720 SE 15 1S 4E SL	Daniel L.ET.AL. Shoell	Echo Reservoir
24	35-7781	E2053	U	T	1982	O	0	7000	0 W700 E4 15 1S 4E SL	Daniel L.ET.AL. Shoell	Echo Reservoir
25	35-7781	E2053	U	T	1982	O	0	7000	N900 W620 E4 15 1S 4E SL	Daniel L.ET.AL. Shoell	Echo Reservoir
26	35-7781	E2053	U	T	1982	O	0	7000	S850 W520 NE 15 1S 4E SL	Daniel L.ET.AL. Shoell	Echo Reservoir
27	35-7781	E2053	U	T	1982	O	0	7000	N900 W430 SE 15 1S 4E SL	Daniel L.ET.AL. Shoell	Echo Reservoir
28	35-7781	E2053	U	T	1982	O	0	7000	S110 W460 NE 15 1S 4E SL	Daniel L.ET.AL. Shoell	Echo Reservoir
29	35-7781	E2053	U	T	1982	O	0	7000	N30 W120 SE 15 1S 4E SL	Daniel L.ET.AL. Shoell	Echo Reservoir
30	35-7993	E2362	U	T	1985	O	0	2000	N30 E30 SW 11 1S 4E SL	Weber Basin Water Conservancy Dist.	Smith and Morehouse Reservoir
31	35-9239	E2607	Su	T	1988	DIO	0	1000	S1000 W600 NE 15 1S 4E SL	Shoichi Oki	Wanship Reservoir

FID[1]	WRNUM[2]	CHNUM[3]	Type[4]	St.[5]	Priority	Uses[6]	CFS[7]	ACFT[8]	Location	Owner	Source
32	35-9240	E2608	Su	T	1988	DIO	0	1000	S1000 W600 NE 15 1S 4E SL	Shoichi Oki	Wanship Reservoir
33	35-9247	E2619	Su	T	1988	DIO	0	1000	S1000 W600 NE 15 1S 4E SL	Shoichi Oki	Wanship Reservoir
35	35-9397	E2802	U	T	1991	S	0	30	N280 E400 SW 11 1S 4E SL	Johnson International	Wanship Reservoir
14	35-8814	t25690	Su	U	2001	O	0	20	S500 E800 NE 15 1S 4E SL	Chalk Creek Hoytsville Water Users Corp.	Silver Creek

[1]FID=map#, [2]WRNUM=Water right number, [3]CHNUM= Change number, [4]TYPE: Sp = Spring, SU=Surface, U = Underground, [5]St=Status: A= Approved, P=Perfected (proof filed, right certified), T=Terminated, U=Unapproved, [6]USES: D=Domestic, I=Irrigation, M=Municipal, Other=Other, S=Stockwatering, [7]CFS= Cubic foot per second, [8]ACFT=Acre feet

Table 7. Soil Types by Plot

Map Unit Name	Plot Number
Ant Flat loam, 2 to 8 percent slopes	NA
Ayoub-Dunford-Melling complex, 15 to 30 percent slopes	NA
Ayoub-Dunford-Melling complex, 30 to 60 percent slopes	NA
Ayoub cobbly loam, 2 to 15 percent slopes	41, 42
Fewkes gravelly loam, 2 to 8 percent slopes	1, 30-34, 38, 48-51
Fewkes gravelly loam, 8 to 15 percent slopes	NA
Horrocks-Cutoff complex, 15 to 30 percent slopes	NA
Melling-Ayoub-Rock outcrop complex, 10 to 30 percent slopes	NA
Wanship-Kovich loams, 0 to 3 percent slopes	6-15, 23-29, 35-37, 39, 40, 43-47

Table 8. Wetland Acres by Parcels

Parcel Number	Wetland Acres
SS-51-C	0.11
SS-28-A-1-X	14.21
SS-51-C-2-X	5.32
MULTIPLE	0.00
S-404	0.00
I-80	2.06
SS-57-1-X	0.00
SS-57-1	0.04
SR 248	0.00
SS-26	0.00
SS-55	0.00
SS-56-UP-X	3.93
SS-56	57.08
SS-56-A	11.70
SS-56-A-1	43.87
SS-56-A-1-X	0.00
SS-56-C-X	0.00
SS-57-1-A-X	0.00
SS-51-C-1-X	0.00
S-303	0.24
SS-51-B-X	0.00
SS-50	40.43
SS-49	21.62
SS-47-X	0.00
SS-47	17.07
SS-44-A-1	0.44
SS-45-UP-X	0.00
SS-44	67.32
SS-51-UP-X	1.16
SS-51-A	4.23
	0.00
US GOVT	0.00
MULTIPLE	26.65
SS-28-UP-X	4.56
I-80	0.95
SS-21-UP-X	1.50
SS-30-A	0.01
SS-29-B-X	0.14
SS-28-A-X	50.29
SS-29	56.04
SCO-C-AM-9	0.00
SCO-C-AM-8	0.00

Parcel Number	Wetland Acres
SCO-C-AM-6-A-X	0.46
SCO-C-AM-7B	0.00
	0.01
SCO-C-AM-6	0.53
SS-65-A-X	0.00
SS-65-2-1	0.00
SS-65-A-7	0.55
SS-65-B	0.50
SS-65-A-3	1.75
U.S. 40	0.00
SS-65-1	1.39
US 40	0.05
no parcel number	0.13
no parcel number	0.43
SS-64-1000-UP-X	12.28
SS-65-A-6	6.72
SS-65-A-5	9.38
SS-65-A-2-A	0.00
ATKINSON ROAD	0.05
SS-65-A-3-1	0.67
SS-64-A	25.40
no parcel number	0.02
SS-66	0.00
I-80	0.03
SS-87	0.00
SS-87-A-X	0.00
SS-29-X	1.09
NS-PROM-RD	0.00
HSD-24	0.00
HSD-25	0.00
HSD-26	0.00
HSD-27	0.00
HSD-28	0.00
HSD-29	0.00
HSD-30	0.00
HSD-31	0.00
SS-65-A	0.09
SS-65-A-8(-A)	1.13
SS-23	0.00
TOTAL	489.75

Table 9. Waters of the US and Non-wetland Waters of the US by Parcel

Parcel Number	Parcel Acres	Waters of the US (WUS) (feet)	Non-Wetland WUS (feet)
SS-51-C	8.36	171.39	0.00
SS-28-A-1-X	39.94	4262.12	913.55
SS-51-C-2-X	45.26	3370.54	188.83
MULTIPLE	0.00	0.00	0.00
S-404	0.52	0.00	0.00
I-80	7.06	758.50	0.00
SS-57-1-X	1.45	0.00	0.00
SS-57-1	111.49	247.10	0.00
SR 248	0.33	0.00	0.00
SS-26	2.61	106.97	265.60
SS-55	7.98	0.00	0.00
SS-56-UP-X	18.71	3329.43	0.00
SS-56	128.61	7210.58	317.68
SS-56-A	49.81	1169.61	0.00
SS-56-A-1	199.34	4902.41	0.00
SS-56-A-1-X	0.27	0.00	0.00
SS-56-C-X	0.02	0.00	0.00
SS-57-1-A-X	6.80	0.00	0.00
SS-51-C-1-X	1.75	0.00	0.00
S-303	2.24	0.00	0.00
SS-51-B-X	1.02	0.00	0.00
SS-50	123.46	7722.94	1230.96
SS-49	30.37	0.00	66.35
SS-47-X	0.00	0.00	0.00
SS-47	160.69	577.76	4198.81
SS-44-A-1	4.46	3.01	0.00
SS-45-UP-X	1.07	254.34	227.73
SS-44	98.22	8460.61	957.59
SS-51-UP-X	16.67	1886.06	1820.81
SS-51-A	13.80	9.98	12.93
	0.16	0.00	0.00
US GOVT	1.97	0.00	0.00
MULTIPLE	64.93	7463.96	972.84
SS-28-UP-X	13.12	41.23	0.00
I-80	6.03	388.19	0.00
SS-21-UP-X	2.80	672.56	0.00
SS-30-A	3.55	0.00	0.00
SS-29-B-X	4.12	71.26	0.00
SS-28-A-X	51.85	6951.71	0.00
SS-29	122.84	9175.69	1617.48
SCO-C-AM-9	0.05	0.00	0.00
SCO-C-AM-8	0.07	0.00	0.00
SCO-C-AM-6-A-X	1.46	249.51	0.00
SCO-C-AM-7B	0.31	0.00	0.00
	0.14	0.00	0.00

SCO-C-AM-6	1.37	619.80	0.00
SS-65-A-X	0.62	0.00	0.00
SS-65-2-1	1.39	0.00	0.00
SS-65-A-7	0.66	0.00	0.00
SS-65-B	11.21	0.92	0.00
SS-65-A-3	7.25	0.00	0.00
U.S. 40	1.09	0.00	0.00
SS-65-1	4.90	133.67	0.00
US 40	1.12	0.00	0.00
	0.26	0.00	0.00
	0.94	56.32	0.00
SS-64-1000-UP-X	17.86	2896.03	0.00
SS-65-A-6	15.15	1149.46	0.00
SS-65-A-5	40.55	2360.06	0.00
SS-65-A-2-A	0.03	0.00	0.00
ATKINSON ROAD	0.18	0.00	0.00
SS-65-A-3-1	2.34	0.00	0.00
	0.12	0.00	0.00
SS-64-A	153.61	3467.74	670.11
	1.36	37.94	0.00
SS-66	8.01	0.00	0.00
I-80	0.53	45.25	0.00
SS-87	0.01	0.00	0.00
SS-87-A-X	0.51	0.00	0.00
SS-29-X	1.34	361.24	0.00
NS-PROM-RD	1.13	0.00	0.00
HSD-24	0.27	0.00	0.00
HSD-25	0.39	0.00	0.00
HSD-26	0.27	0.00	0.00
HSD-27	0.21	0.00	0.00
HSD-28	0.24	0.00	0.00
HSD-29	0.24	0.00	0.00
HSD-30	0.26	0.00	0.00
HSD-31	0.13	0.00	0.00
SS-65-A	0.47	18.22	0.00
SS-65-A-8(-A)	88.91	0.00	384.66
SS-23	1.53	0.00	0.00
	TOTAL	**80604.13**	**13845.93**

Table 10. Wetland Functional Points and Wetland Classification Category

Plot	Wetland Classification	Wetland Subclass	Wetland Category	Total Functional Points	Possible Points	Percent Total Functional Points	Wetland Acreage
1	Slope	Seasonal Fresh Water	III	3.4	5.8	.5862	82.3
6	Riverine	D	III	3.7	6.8	.5441	402.7
7	Riverine	D	III	3.7	6.8	.5441	402.7
8	Riverine	D	III	3.5	6.8	.5147	402.7
9	Riverine	D	III	3.4	6.8	.5000	402.7
10	Not a wetland	NA	NA	NA	NA	NA	NA
11	Riverine	D	III	3.9	6.8	.5735	402.7
12	Riverine	D	III	NA	NA	NA	NA
13	Riverine	D	III	3.5	6.8	.5147	402.7
14	Not a wetland	NA	NA	NA	NA	NA	NA
15	Riverine	D	III	3.5	6.8	.5147	402.7
23	Not a wetland	NA	III	NA	NA	NA	NA
24	Not a wetland	NA	NA	NA	NA	NA	NA
25	Riverine	D	III	3.9	6.8	.5735	402.7
26	Riverine	D	III	3.9	6.8	.5735	402.7
27	Riverine	D	III	3.9	6.8	.5735	402.7
28	Riverine	D	III	3.9	6.8	.5735	402.7
29	Riverine	D	III	3.5	6.8	.5147	402.7
30	Riverine	D	III	3.9	6.8	.5735	402.7
31	Slope	Seasonal Fresh Water	III	3.6	5.8	.6207	82.3
32	Slope	Seasonal Fresh Water	III				82.3
33	Slope	Seasonal Fresh Water	III	3	5.8	.5172	82.3
34	Not a wetland	NA	NA	NA	NA	NA	NA
35	Riverine	D	III	3.9	6.8	.5735	402.7
36	Same point as 35	-	-	-	-	-	-
37	Not a wetland	NA	NA	NA	NA	NA	NA
38	Not a wetland	NA	NA	NA	NA	NA	NA
39	Not a wetland	NA	NA	NA	NA	NA	NA
40	Not a wetland	NA	NA	NA	NA	NA	NA
41	Riverine	D	III	3.9	6.8	.5735	402.7
42	Riverine	D	III	3.9	6.8	.5735	402.7
43	Riverine	D	III	3.9	6.8	.5735	402.7
44	Riverine	D	III	3.9	6.8	.5735	402.7
45	Riverine	D	III	3.9	6.8	.5735	402.7
46	Not a wetland	NA	NA	NA	NA	NA	NA
47	Riverine	D	III	3.9	6.8	.5735	402.7
48	Riverine	D	III	3.9	6.8	.5735	402.7
49	Slope	Seasonal Fresh Water	III	2.8	5.8	.4828	402.7
50	Not a wetland	NA	NA	NA	NA	NA	NA
51	Slope	Seasonal Fresh Water	III	3.6	5.8	.6207	82.3

Wetland Classification	Wetland Category	Average Total Functional Points	Wetland Acres
Slope	III	.5021	82.3
Riverine	III	.5578	402.7

APPENDIX A
HISTORIC CLIMATE RECORDS (YEARS 1971-2000)
WETS TABLE

APPENDIX B
PRECIPITATION RECORDS (YEARS 2002-2007)

APPENDIX C
WATER RIGHTS HYDROGRAPHIC MAPS

APPENDIX D
WATER RIGHTS DIVERSION STATION PHOTOS

APPENDIX E1
CORRELATES WITH TABLE 4 POINT OF USE WATER RIGHTS

APPENDIX E2
CORRELATES WITH TABLE 6 CURRENT STATUS WATER RIGHTS

APPENDIX E3
ADJACENT WATER RIGHT OF SIGNIFICANCE

APPENDIX F
TABLE OF ADJACENT WATER RIGHTS POINTS OF DIVERSION WITHIN A 1000FT BUFFER

APPENDIX G
EXAMPLE OF FUNCTION AND VALUES ASSESSMENT FORMS

APPENDIX H
SELECTING A WETLAND CLASSIFICATION

APPENDIX I
LOWER SILVER CREEK VEGETATION SPECIES LIST

APPENDIX J
WETLAND PHOTOS

APPENDIX K
DATA FORM ROUTINE WETLAND DETERMINATIONS